

DESCRIPTIONS OF THE LARVÆ OF SOME MOTHS FROM COLORADO.

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With the sanction of the Secretary of the Smithsonian Institution, I spent three months in Colorado in the summer of 1901, to investigate the life histories of some of the moths of that region. As Colorado embraces several different faunal regions, and as the arid condition of the country renders the fauna very sparse and sporadic, different conditions are found to obtain there than in the Atlantic region in the matter of collecting. It was found impossible to move about so as to cover various faunal regions without losing the larvæ already collected in one place, owing to the impracticability of keeping a fresh supply of food plants. I located in Denver and collected mainly on the prairies and foothills within 20 miles of that place. Mr. A. N. Caudell, of the Department of Agriculture, accompanied me, and was allowed to assist me by the permission of the entomologist of that Department.

The species of Lepidoptera occurring in Colorado indicate four faunal regions in the State. (1) The prairie fauna occupies all the flat land from the bases of the foothills eastward, probably including the eastern third of the State and reaching to Texas. It is composed largely of species peculiar to the region. The very dry condition of this land and the sparse vegetation, mostly disappearing early in the season, with the absence of trees, renders this condition necessary. (2) The fauna of the foothills occupies the hilly and uneven land from the bases of the mountains up to timber line. The line of division between this fauna and that of the prairie is very marked. The foothills rise quite sharply from the plains, and within a few paces, almost, the change in the fauna is observable. The foothills have a few trees, pine, and other evergreens, with a dwarf oak, all sparsely distributed; a hardy bush, *Cercocarpus parvifolius*, seems to prefer the most unfavorable hill tops. In the bottoms of the canyons, where water persists, cottonwood, willow, and other trees occur, often densely, which permits the occurrence of many species belonging to the Atlantic region

that are absent from the other faunal regions of Colorado. I did not notice any essential change in the fauna with altitude, from the base of the foothills (5,000 feet) to timber line (12,000 feet). Naturally the individuals were later to emerge in the higher altitudes, but on the whole they were the same species. (3) The Alpine fauna occurs on the high peaks above timber line. It is a small fauna, but entirely distinct from the others. It is essentially that of all mountain peaks, being comparable with the mountain summits of New Hampshire and with Labrador. (4) The fauna of western Colorado occupies the valleys west of the continental divide and doubtless extends to the Sierra Nevada of California and to Mexico. It was impossible to obtain any larvæ from this region, much to my regret. Efforts were made to do so, but proved ineffectual without sacrificing the larvæ that had been collected in the eastern foothills. It is of these latter, with a few from the prairie region, that I have made note.

The following is only a partial list of species observed. Those of which the larvæ did not come under observation, even though the moths were collected, are not mentioned. Besides the 69 species here noted, I have given full life histories of 10 species of Geometridæ in "Psyche," descriptions of the larvæ of 3 species of *Depressaria* in Mr. Aug. Busck's paper on that genus, 5 species of *Gelechia* in Mr. Busck's article on the Gelechiidæ, and of *Triprocris smithsonianus* in the Proceedings of the Entomological Society of Washington. A number of species were noted but not bred, and there remain several not yet satisfactorily determined, to which I shall revert when the opportunity offers.

LIST OF SPECIES.

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| <i>Hemileuca maia</i> Drury. | <i>Syueda hastingsii</i> Henry Edwards. |
| <i>Hemileuca nevadensis</i> Stretch. | <i>Alypia maccullochii</i> Kirby. |
| <i>Pseudohazis shastaensis</i> Behrens. | <i>Malacosoma tigris</i> Dyar. |
| <i>Apantesis superba</i> Stretch. | <i>Endule unicolor</i> Robinson. |
| <i>Apantesis figurata</i> Drury. | <i>Hydriomene trifasciata</i> Borkhausen. |
| <i>Leptarctia californix</i> Walker. | <i>Sciagraphia perrolata</i> Hulst. |
| <i>Leucarctia aerea</i> Drury. | <i>Diastictis occiduaria</i> Packard. |
| <i>Eubaphe aurantiaca</i> Huebner. | <i>Aleis haydenata</i> Packard. |
| <i>Halisidota maculata</i> Harris. | <i>Enemera jutrurnaria</i> Guenée. |
| var. <i>alni</i> Henry Edwards. | <i>Epiplatymetra coloradaria</i> Grote and Robinson. |
| <i>Heliothis phlogophagus</i> Grote and Robinson. | <i>Odontosia elegans</i> Strecker. |
| <i>Caradrina extima</i> Walker. | <i>Pheosia dimidiata</i> Herrich-Schaeffer. |
| <i>Leucania furcata</i> Grote. | <i>Tortricidia testacea</i> Packard. |
| <i>Stretchia plusiiformis</i> Henry Edwards. | var. <i>crypta</i> Dyar. |
| <i>Xylina torrida</i> Smith. | <i>Melitara junctolineella</i> Hulst. |
| <i>Xylomiges simplex</i> Walker. | <i>Acrobasis betulella</i> Hulst. |
| <i>Thyreion rosea</i> Smith. | <i>Pionea belialis</i> Druce. |
| <i>Cucullia latifeca</i> Lintner. | <i>Oxyptilus delawarensis</i> Zeller. |
| <i>Ipimorpha pleonectusa</i> Grote. | <i>Pecophorus sulphureodactylus</i> Packard. |
| <i>Cissura valens</i> Henry Edwards. | <i>Platyptilia cosmodactyla</i> Huebner. |
| <i>Syneda howlandii</i> Grote. | |

Alucita cinerascens Walsingham.

Teras foliana Walsingham.

Cacacia argyrosipila Walker.

var. *viridana* Dyar.

Cacacia seniferana Walker.

Cacacia negundana Dyar.

Cacacia cerasiflorana Fitch.

Cacacia rosaceana Harris.

Lophoderus coloradana Fernald.

Ctenopis directana Walker.

Platynota labiosa Zeller.

Orchemia diana Huebner.

var. *betuliperda* Dyar.

Cerostoma rubrella Dyar.

Gnorimoschema coquillettella Busck.

Anactimpis innocuella Zeller.

Nealyda bijidella Dietz.

Gelechia ribesella Chambers.

Gelechia unctella Zeller.

Gelechia pravinominella Chambers.

Gelechia anarsitella Chambers.

Gelechia versutella Zeller.

Gelechia ocellella Chambers.

Gracilaria pnosmodiella Busck.

Gracilaria thermopsella Chambers.

Leucoptera albella Chambers.

Lithariapteryx abronivella Chambers.

Lithocolletis cincinnatiella Chambers.

Lithocolletis basistrigella Clemens.

Lithocolletis fitchella Clemens.

Lithocolletis salicifoliella Clemens.

Tisheria cinctipennis Clemens.

Family SATURNIIDÆ.

HEMILEUCA MAIA Drury.

Larva.—Head and feet dark mahogany red in the last stage, black before that; width 4.5 mm. Body black, thickly covered with secondary yellow dots centered by black hair tubercles; subdorsal, lateral, and waved substigmatal lines yellow, broken; incisures reddish. Spines all long, some setæ white; spiracles black, the elevated spots behind them on joints 5 and 11 reddish.

This larva is well known in the Atlantic coast region from Massachusetts to Florida and has been often described. The young larvæ were found gregariously on the oak on May 20, in a gulch leading up from the Platte Canyon. They were matured about the 1st of July. No moths were bred, but I can not doubt the identification, as the larva is very familiar to me.

HEMILEUCA NEVADENSIS Stretch.

Larva.—Head, plates, and feet very bright mahogany red; width 4.5 mm. Body with the yellow spots confluent all over the dorsal and lateral spaces, making the ground color yellow except narrowly subdorsally and ventrally. Spines of the upper row all bright brown, the long ones with black shafts.

This larva is well known in the Pacific coast region and through the arid West, and has been described in all its stages. Several were found on willow near Denver by a water course in the prairie, and were matured about the 1st of July. A moth emerged in September.

The occurrence of these two species within a few miles of each other, but in different faunal regions, is interesting, both as illustrating that they are different species though so similar, and how the Atlantic coast fauna is interpolated in the middle of the Western one along the foothills of the Rocky Mountains.

PSEUDOHAZIS SHASTAENSIS Behrens.

Larva.—Head high, tapering conically, clypeus low, sutures impressed, erect, free, shining black; width 4.5 mm. Body purplish black with faint traces of white lines, the subventral the most distinct; secondary hairs fine, pale, with imperceptible tubercles. Upper row of spines shortened on joints 5 to 12, most of the spinules buff yellow; some buff ones also on the not shortened upper spines of joint 4; other spines black; no white dots on the body.

The larvæ were found, gregarious when young, on rose and wild cherry on the foothills back of Golden. They were matured about the middle of July. *Pseudohazis* occurs all through the West, but there are three forms or species. The one occurring on the eastern foothills is the one with pink ground color in the fore wings that I call *shastaensis*, as proved by examples in Prof. C. P. Gillette's collection.

Family ARCTIIDÆ.

APANTESIS SUPERBA Stretch.

Larva.—Head shining black, labrum yellowish, antennæ pale, pinkish at base; width 3.3 mm. Body black, thoracic feet black, the abdominal ones pinkish, pale. Warts large, normal, arctiidiform, i and ii with shining bases, i over half as large as ii, which is elongate. Hair abundant, bristly, sparsely barbed, rather short before, long on joints 12 and 13; most of the hair from wart i and a few on the sides of ii are yellow, below this jet black mixed with white, mostly white from warts iv to vi. Warts iii orange, the rest black. A light yellow dorsal line, broken into three spots on each segment, distinct, most of them lanceolate; a line on joints 2 and 3, no shields; joint 2 with little warts, normal.

A variety had the dorsal line nearly obsolete, composed of a few dots; wart iii black like the others. Hairs nearly all yellow, only a few black ones mixed; some longer white ones posteriorly.

Found at Boulder and Golden in the foothills on the ground or feeding on low plants, *Astragalus* and *Lupinus*. The larvæ were very lively and would run for shelter when discovered. They became matured in June, apparently from hibernated larvæ. Moth, July 13. Though not uncommon they were hard to rear, and only one female was obtained. I think, however, that this is the larva of *A. incorrupta*, of which I have only males.

A parasite, *Tachina mella* Walker, was bred from one larva.

APANTESIS FIGURATA Drury.

Larva.—Head shining black, epistoma and bases of antennæ pale; width 2.7 mm. Body brown-black, the abdominal feet pale reddish. A broad, distinct, sharp dorsal line, narrowed between warts i, cream

white, pinkish shaded in the incisures. Warts black, hair bristly, sparsely barbuled; i small, less than one-third the size of ii, i with small, ii with large shining base, normal. Hair all black, even the sub-ventral, longer on joints 12 and 13.

One larva found by Mr. E. J. Osler on the foothills, May 12; it fed on alfalfa. The moth that emerged was of the form *f. pallida* Strecker.

LEPTARCTIA CALIFORNIÆ Walker.

Egg.—Low conoidal, practically two-thirds spherical, shining pearly flesh color; rather coarsely reticularly shagreened, almost definitely reticulate at the vertex, but the lines broad and confused; diameter 1 mm., height 0.7 mm.

Stage I.—Head bilobed, erect, shining black. Body translucent, faintly yellowish, warts and shields dark brown, thoracic feet black; slight reddish-brown shading about the warts. On thorax warts ia and ib united on a single large plate, single haired; iib small, shortly separated from iia; iv single, vi double, no subprimaries. On abdomen i small, ii on a large plate, iii with two hairs, iv and v single, iv well behind the spiracle, vi absent, but a small, elongate, hairless shield in its place; vii forming a well-developed shield on the leg. Cervical shield with four hairs on each side, three of them black; two other hairs detached on a tiny wart. Joint 13 anteriorly has one wart with four hairs and one with two. The rudimentary tubercle vi is present on joints 5 to 12. Hairs long and fine.

The remaining stages have been fully described by Prof. G. H. French.¹ He found five stages, which my observations do not contradict. Mr. Osler secured me some eggs, and I obtained others from moths taken on the foothills behind Golden, and later I found some larvæ there on the ground or feeding on low plants. The species is not uncommon in the foothills and canyons; I remember it to have been abundant in Williams Canyon near Maniton in 1891.

LEUCARCTIA ACRAEA Drury.

This ubiquitous larva occurred on the prairie and on the foothills as high as Salida, where Mrs. A. N. Caudell collected one. The species seems to despise all natural boundaries and be at home in all four regions.

EUBAPHE AURANTIACA Huebner.

Eggs.—Rather low, roundedly conoidal, the base flat and slightly rimmed; shining pale yellow. Reticulations narrowly linear, irregularly hexagonal, not raised, faint. Diameter, 0.6 mm. Turned dull pink.

Stage I.—Head rounded, cordate, pale luteous, shining, broadly

¹Can. Ent., XXI, 1889, p. 210.

gray shaded over the vertex; eye black. Body normal, aretiiform, pale luteous, warts and shields smoky; hairs dark, long, especially long from joints 5, 6, and 12. Warts i conjoined on the dorsal line into a single pentagonal shield on joints 5 to 11, two separate, elongate, parallel shields on joint 12, single haired; ii single haired, produced forward and downward; iii to v single, normal; vi absent. On the thorax tubercles ia+ib, iia, and iib separate, iib posterior, iv large, vi moderate; no subprimaries. Warts of joint 13 consolidated. Hairs i to iii black, the rest white, spinulose. Cervical shield not converted into warts, divided, notched behind. Feet colorless, long and slender, especially the abdominal ones.

Stage II.—Head bilobed, shining dusky. Body greenish from the food, transparent, shining. Warts small with numerous stiff hairs; i rudimentary, hairless. Hairs dark, spinulose.

Stage III.—Head shining black, bilobed; width about 0.4 mm. Body shining dusky luteous, warts black; i small, paired. Hairs black, moderate, of various lengths, barbed.

Stages IV and V were not described; there was no marked change.

Stage VI.—Head bilobed, aretiiform, black; width 1.4 mm. Body brown, not dark, rather sordid and pale, the lighter-colored warts iii and v orange tinted; a straight dull-orange dorsal line. Warts black; hair black dorsally, pale subventrally, rather bristly, sparse, longer posteriorly. Warts well elevated, round, i small, iv absent, the rest large. All have black hairs at the summit, white ones at the base, but there are more black ones dorsally.

Cocoon a delicate web of silk. Moths emerged August 8, from eggs obtained from moths flying in the foothills June 27.

HALESIDOTA MACULATA Harris, variety ALNI Henry Edwards.

This species occurs in three forms in the United States. Those inhabiting the northern Atlantic region and the northern Pacific region, respectively, are indistinguishable in the moth state, though different as larvæ. I have several times received *H. maculata* from Colorado, but never knew to which race to refer the specimens. Mr. Caudell took a larva near Salida and Professor Gillette has in his collection some cast skins. Both show the red dorsal hairs of *alni*, proving the Coloradan form the same as the northern Pacific coast one.

Family NOCTUIDÆ.

HELIOTHIS PHLOGOPHAGUS Grote and Robinson.

Stage I.—Head round, bilobed, black, polished, the vertex under joint 2; epistoma and antennæ white; width about 1.6 mm. Body cylindrical, normal, joint 12 not enlarged but a little angled. Tubercles large, conic, polished black, prominent. Skin spinulose; setæ

large, pale, curved. Black with yellow dorsal line, fine, broken pulverulent; subdorsal line double, running along tubercles i and ii, similar, a little less broken; lateral line broader, broken on the annulet incisures; traces of a line along tubercle iii; stigmal band broad, including the spiracles and tubercle iv, sharp edged, luteous centered. Feet black. Shields uncornified concolorous, their tubercles black.

Stage VI.—Head green, brownish freckled on the vertex, ocelli black, epistoma whitish; width 2.7 mm. Body cylindrical, normal, shields not cornified. Skin white, granular, spinulose; tubercle iv at center of spiracle or above. Green, traces of a whitish dorsal and subdorsal line; stigmal band broad, whitish green, white edged below; dorsal line obscure, geminate, blackish filled. Tubercles raised, conic, small, black, white ringed. Feet equal, green. Subdorsal line cuts the cervical shield. Spiracles black rimmed, pale bordered.

Food plant *Grindelia squarrosa*. Found in the Platte Canyon May 30 and collected by Mr. E. J. Osler at Manitou.

CARADRINA EXTIMIA Walker.

Eggs.—Spheroidal, flattened at base, about 40-ribbed, the number diminishing toward the vertex; ribs sharp, narrow, the apices concave, with distinct, curved cross-striæ about as distinct as the lines on the ribs. Vertex hollowed reticulate; yellowish white, stained with an irregular brown ring; diameter, 0.6 mm.; height, 0.4 mm.

Stage I.—Head round, vertex under joint 2, sordid luteous, eye black; width, 0.3 mm. Body cylindrical, thick, joint 12 large dorsally; sordid whitish, the food faintly green; tubercles large, round, black, distinct, normal; ia to iib on the thorax separate, equal, iv on the abdomen behind the spiracle. Shields and leg plates blackish luteous, normal; setæ pale.

Stage II.—Head rounded, blackish; width, 0.5 mm. Body translucent, green from food; cervical shield, anal plate, and the rather large tubercles black. Traces of white dorsal and subdorsal lines; feet pale, those of joints 7 and 8 a little shorter than the others; shields blackish, setæ pale.

Stage III.—Head dark smoky brown, blackish over the lobes, round, scarcely bilobed, apex slightly under joint 2, but held erect; width, 0.9 mm. Body thick, robust, cylindrical, no enlargements. Dorsum gray brown to spiracles, faintly mottled in pale, forming traces of the usual lines. Below the spiracles sharply paler, slightly pinkish. Tubercles rounded, elevated, blackish, normal, iv at the top of the spiracle. Feet and leg shields smoky blackish. Setæ rather long, pale, curved.

Stage IV.—Head dark smoky brown, clypeus paler, sordid; held erect, slightly retracted; width, 1.2 mm. Body sordid brown, mot-

tled, subdorsal line diffuse above, obscurely pale. Color paling ventrally but not sharply. Tubercles black. Very obscurely colored and without defined marks.

Stage VI.—The same, pale, obscurely marked. Dorsal space broadly paler mottled, all sordid brown. I have previously described this stage.¹ Width of head 1.8 mm.

Eggs from a female moth taken at Denver, June 23. Moths issued from these larvæ August 13. The larvæ fed readily on *Polygonum*; probably they would eat any low plants.

LEUCANIA FARCTA Grote.

Eggs.—Spheroidal, distinctly flattened above and below, about alike at the ends, somewhat irregularly shaped from pressure as they were laid in a crevice, glued to both sides but weakly. Shining pale yellow. Reticulations finely linear on a smooth surface, irregularly 4 to 6 sided; no trace of ribs. Flattened sides smooth, somewhat plainly rimmed; diameter 0.6 mm.

Stage I.—Head round, luteous, ocelli large, black; width 0.3 mm. Body cylindrical, joint 12 enlarged dorsally, joints 5 and 6 enlarged; semilooping, but the feet of joints 7 and 8 only a little smaller than the others; segments rather roughly 3 to 4 annulate, especially on thorax. Whitish translucent; cervical shield small, brownish; food faintly yellowish, no marks. Tubercles and setæ obsolescent and scarcely visible. Thoracic feet brownish at tip; no leg shields nor anal plate; setæ pale.

Stage II.—Head rounded, slightly bilobed, erect, antennæ rather large; translucent testaceous, dark on the vertex from within, ocelli black, mouth brown; width 0.5 mm. Body cylindrical, rather larger behind the thorax and at joint 12. Dull gray-green dorsally, whitish ventrally with narrow whitish dorsal, subdorsal and lateral lines; the division between the dorsal and ventral colors is sharp. No shields; tubercles small, vi present. Feet pale, normal, practically equal.

Stage III.—Head rounded, bilobed, apex in joint 2; dull luteous; width 0.8 mm. Body smaller behind but subequal, scarcely any enlargements. Finely striped in brown and olivaceous yellowish. Ground pale olivaceous; dorsal line whitish, brown edged; subdorsal line whiter, brown edged, very distinctly so below; below this a yellowish white line; lateral line yellowish white, brown edged; stigmal band white, brown edged, heavily so above; three broken subventral lines; feet and venter pale, scarcely marked. No shields.

Stage IV.—Head held flatly but free from joint 2, luteous, brown reticulate; width 1.4 mm. Body striped in olivaceous yellow and brown. Geminate dorsal, addorsal, broad subgeminate subdorsal lines

¹ Proc. Ent. Soc. Wash., IV, 1899, p. 322.

brown; geminate lateral olivaceous filled; broad dark lower lateral and suprastigmatal; substigmatal broad, pale yellow, red filled, folded subventrally. Two weak lines subventrally and faint traces of ventral dark lines. Feet pale, dusky shaded, equal.

Stage V.—Head the same, the reticulations heaviest in a line each side of clypeus and in middle of lobe; width 2 mm. Lines as before, but the lateral is not discolorously filled; all lines red-brown except the broad lower lateral and suprastigmatal which are olivaceous brown.

Stage VI.—Head rounded, scarcely bilobed, erect, free; testaceous, shining, reticulate with dark brown, forming a narrow shaded band edging the paraclypeal pieces, divergent again at the vertex; a less distinct dark line up from the eye; clypeus and median suture broadly pale; tubercles brown; width 3.2 mm. Body cylindrical, normal, not tapering, no enlargements; feet normal, equal. Testaceous, finely strigose lined in red-brown. Dorsal line narrow, pale; a faint, similar line between tubercles i and ii; subdorsal band broad, gray-brown strigose, pale edged above and below, straight; space below red-brown, strigose. Lateral and stigmatal bands broad, gray-brown strigose, contiguous, separated only by the narrow pale edging, the lateral band also edged above in pale, the stigmatal below, this edge being the upper border of the substigmatal band, which is broad, straight, red-brown strigose filled, except at its pale edges. Venter, mottled strigose. Shields undeveloped, concolorous. Tubercles small, black; iv at the upper corner of the spiracle. Spiracles black. Thoracic feet pale, brown tipped; abdominal ones of joints 7 to 10 with smoky blackish shields, excavate above; anal feet reticularly lined.

The moth approaches closely to *L. juncicola* Boisduval and *L. multilinea* Walker, but I have the larvæ of neither to compare. From *L. phragmatidicola* they differ in the color being lighter throughout, the ground testaceous rather than pale brown; the markings are identical in both.

STRETCHIA PLUSIFORMIS Henry Edwards.

Eggs.—Ellipsoidal, scarcely more flat at base than at vertex; neatly 30-ribbed, diminishing by a few toward vertex, the ribs gently waved; cross-striæ fine, indistinctly seen on the sloping sides of the ribs, the vertical reticulation lines on the summits of the ribs not more distinct than the cross-striæ. Micropylar area broadly smooth, finely reticulate. The sculpture reaches a little beyond the lower third of the egg, which is perfectly smooth and shining. Diameter 0.9 mm., height 0.6 mm. Later there appeared a red ring and spot at the summit.

Stage I.—Head rounded, faintly bilobed, full, broad, pale luteous with black ocelli, erect; clypeus narrow, sutures grooved; width about 0.4 mm. Body slender, submoniliform, flattened; feet normal, the two anterior abdominal pair somewhat shortened; joint 12 slightly enlarged. Whitish colorless, translucent, the alimentary canal appear-

ing sordid reddish; shields concolorous, pale luteous, not large. Tubercles small, black, distinct, normal; setae short, pale; feet colorless. The larvæ were quiet and sluggish, remaining hidden all day.

Stage II.—Head rounded, slightly bilobed, larger than joint 2, the lobes full; held obliquely; pale luteous with minute brown dots on the tubercles and a patch on each side of the median suture; antennæ and labrum partly pale; width 0.6 mm. Body cylindrical, normal, joint 12 slightly enlarged; feet normal, but those of joints 7 and 8 slightly reduced. Sordid whitish, shields concolorous, scarcely cornified; narrow white dorsal and subdorsal lines, a broader stigmatal one, irregular and blotched. Tubercles neatly black; feet pale; setae moderate.

Stage III.—Head rounded, polished orange, the clypeus and sutures more yellowish, mouth brown, ocelli black; width 1 mm. Body cylindrical, noctuiform, joint 12 enlarged, joints 3 to 6 arched in rest. Green, sordid, subtranslucent; neat, narrow, white dorsal and subdorsal lines; a broad white substigmatal band inclosing tubercles iv and v and the spiracle. Feet normal, equal. Tubercles neat, round, moderate, with the spiracles black, the latter narrowly ringed. Shields concolorous, the cervical shield polished. Feet all pale, the abdominal ones with the tubercles vii black. A brown form of the larva also occurred. All shaded with dilute black between the lines; stigmatal band slightly yellowish; feet pale but sordid tinted; head as in the green form.

Stage IV.—Head rounded, the vertex slightly under joint 2, shining brown, mottled with darker; width 1.5 mm. Body thickly mottled with chocolate brown on a whitish ground, the dorsal space lighter by the ground showing more distinctly. Fine dorsal and subdorsal white lines somewhat dotted and broken; stigmatal line broad, sharply edged, narrowed in the incisures, white edged, broadly dull red and luteous filled, including tubercles iv and v and the spiracles which are white, narrowly black rimmed. Tubercle iv at center of spiracle, or above on joints 9 and 10. Venter paler; feet pale; tubercles in rather large black spots. Shields concolorous.

Stage V. (Interpolated).—One larva had this stage with markings as in the previous one. Width of head 1.8 mm.

Stage VI. (Normal V).—Head rounded, the apex under joint 2, shining pale brown, reticulated with dark, a dark patch on each side of the clypeus; width 2.3 mm. Cervical shield shining brown, a darker spot before and on the anterior angle, produced backward into a lateral border; dorsal and subdorsal lines faint, pale. Body robust, joint 12 enlarged, joint 13 somewhat perpendicularly truncate, its foot nearly under the hump of joint 12; thorax a little smaller than abdomen. Brown mottled, chocolate on a light yellowish ground. Dorsal line of few white dots in the center of the segments, edged by a dark cloud; subdorsal line similar, more continuous; lateral space heavily dark

shaded; stigmal band brown, of the ground color, filled with light brown and reddish mottlings, not contrasted; subventral space but a shade darker, mottled. Tubercles in small brown spots; feet pale. Tubercle iv above the center of the spiracle on joints 9 and 10. Posterior parts of subdorsal space segmentarily paler, forming a transverse band of pale on the hump on joint 12. Spiracles black ringed.

Eggs from a moth captured in Denver. The food plant is the wild currant. Eggs May 12, mature larvæ June 24.

The larva of this somewhat striking moth proves to be a very plainly colored, day hiding Noctuid.

XYLINA TORRIDA Smith.

Larva.—Head rounded, not bilobed, erect, green, epistoma and bases of antennæ white; width 3 mm. Body normal, joint 12 not enlarged, joint 13 tapering; robust, cylindrical. Clear green; a straight, white dorsal line on joints 3 to 13, granular shagreened; tubercles small, white; skin minutely white peppered. Subdorsal line narrow, broken, granular, white; traces of a similar lateral line; substigmal line narrow, granular, pale yellow, from joint 2 to the anal plate. Feet green; spiracles white, finely black rimmed. Tubercle iv at the lower corner of the spiracle. Cervical shield green; anal feet shortly extended backward, white lined. Later there is a white dorsal shade, the stigmal line is yellow, the subdorsal one obscure.

Pupation in the ground. Larva found on wild cherry in the Platte Canyon May 21; imago emerged September 25.

XYLOMIGES SIMPLEX Walker.

Stage III.—Head rounded, black; width 0.9 mm. Cervical shield quadrate, black; body rather thick, cylindrical, noctuiform, joint 12 scarcely enlarged, very sordid whitish, almost gray, with narrow white dorsal and subdorsal lines, the latter edging the cervical shield; fainter lines along tubercles iv and v. Tubercles round, slightly elevated, black, distinct, normal. Leg plates and anal plate black; feet black; setæ dusky, short; tubercles faintly pale ringed.

Stage IV.—Head shining black, epistoma and bases of antennæ sordid white; width 1.6 mm. Cervical shield black, trisected in white narrowly. Body purplish black, pale mottled; dorsal and subdorsal lines white, discreet, broken; stigmal band yellowish, luteous centered, including the spiracle and reaching to tubercle v, sharp edged. Tubercles black, rounded, elevated, polished. Setæ rather long, pale. Venter sordid greenish, purplish shadowed.

In stages V and VI the head became red brown, but as I have already described these stages¹ I will not transcribe my notes. The larvæ occurred hiding in spun leaves on wild plum in the Platte Canyon and

¹Can. Ent., XXVI, 1894, p. 21.

on various plants at Sedalia. No moths were bred, but the larvæ are obviously the same as those formerly bred by me, and *Xylomiges simplex* is native to the region, for I took it abundantly at Manitou in May, 1891.

THYREION ROSEA Smith.

Eggs.—Hemispherical, the base flat, about 28 vertical ribs, low, rounded, diminishing regularly by alternation at the upper three-fourths and ending at the micropyle, forming a slightly depressed ring; vertex again a little elevated, reticulate. Cross-striae faint, but the cell areas slightly hollowed, a row on each side of each ridge, the joinings in the hollows and on vertices of ridges which appear somewhat beaded; color pearly white; diameter 0.8, height 0.4 mm.

Stage I.—Head rounded bilobed, mouth pointed, shining black; width 0.4 mm. Cervical shield black, excised at the posterior angles and a little so on the dorsal line posteriorly; anal plate faintly dark tinted. Body normal, white, no marks. Tubercles very small, with moderate, pointed setæ, black. Thoracic feet blackish ringed, abdominal ones normal, equal, pale. On hatching the larvæ entered completely within the leaves of the food plant, where they burrowed between the epidermes.

Stage II.—Head rounded, brown black; width 0.6 mm. Cervical shield and plates dark brown; body all white, immaculate, the small tubercles dark.

Stage III.—Head pale yellowish luteous, sutures, area about eyes and jaws broadly brown; width 0.9 mm. Body all whitish, cervical shield a little shining and a shade yellower, but practically concolorous. Tubercles minute, setæ moderate, dark. Feet normal; spiracles black ringed, rather round.

Stage IV.—Head round, bilobed, compact, and smooth, vertex level, clypeus rather high, nearly reaching the membranous triangle, showing dark brown; sutures and rims of lobes posteriorly blackish; width 1.2 mm. Cervical shield large, the posterior angles rounded, scarcely notched behind, shining light brown, with two detached setæ on the lower side not on a shield. Anal plate shining brown, with dark tubercles. Body all opaquely white, the tubercles small, brown, with short, stiff, dark setæ. Spiracles brown rimmed. Feet normal, the crochets in a neat half circle on the inner side of the planta. Tubercle iv at lower corner of spiracle.

Stages V and VI were not obtained. The larvæ feed at first internally in the leaves of the wild onion, *Allium* sp.; Mr. Osler tells me that he has seen them devour the whole plant, eating down into the bulb. The moth flies at the time the plants are in blossom and rests on the flowers, where it is inconspicuous, its pink and whitish colors harmonizing with those of the blossoms. Found on the prairie near Denver, May 29.

CUCULLIA LAETIFICA Lintner.

Larva.—Head rounded, bilobed, erect, free; white, sutures of clypeus, a broad band from antenna to above clypeus joined by dottings to another band covering the backs of the lobes and sides black; width 3.2 mm. Body greenish white with diffuse, clouded, dorsal, subdorsal (fainter), and stigmatal yellowish bands; curiously black banded. Three irregular transverse bands on each segment; one across tubercles i and ii, widened there, joined by an anteriorly situated dorsal bar, rounded furcate laterally; an irregular dark anterior band and a broken posterior one, enlarged into a subdorsal spot. Irregular black markings subventrally and on the feet; tubercle vi in a white space. Feet normal, equal; thoracic ones black marked; tubercle iv at the lower corner of spiracle or below. In some examples the black is joined in a subdorsal line.

Larvæ at Golden and Sedalia on the prairie near the base of the foothills on a low tufted species of *Chrysothamnus*. Found early in June in the last four larval stages, no marked difference except in size. These handsome larvæ resemble those of a *Pupilio* of the *asterias* group to a remarkable degree. Pupation in the earth in a rather firm cell of considerable size, lined with silk. First imago July 5.

IPIIMORPHA PLEONECTUSA Grote.

Larva.—Head broad, slightly bilobed, flat before, white with a broad black band on the angle on each side, irregularly edged, meeting vertically except for the suture; epistoma surrounded by brown; width about 3 mm. Body light green, translucent, densely minutely clear granular. A white dorsal stripe and a narrower broken subdorsal one; substigmatal line white, narrow; all the lines reaching from joint 2 to the anal feet, but the green shield only faintly white lined. Tubercles i and ii white, the rest green, obscure; spiracles flesh colored, dark rimmed; claspers whitish.

The larva was found hiding in a folded leaf made by a Tineid on the cottonwood in Denver. It hid most persistently, and was disturbed on being forcibly exposed. Mature larva early in June; imago July 10.

CISSURA VALENS Henry Edwards.

Stage IV.—Head round, full above, oblique, the apex almost under joint 2, dark gray, heavily mottled reticulate with black on a white ground, leaving a conspicuous white speck on the face of each lobe; width 1.5 mm. Body slender, elongate, the feet on joints 7 and 8 much smaller than the others. Whitish gray, silky, shining; dorsal and addorsal lines gray, dotted powdery; addorsal line straight, widened centrally on the segments; subdorsal line black, waved, bending upward in the incisures. Lateral, suprastigmatal and two subventral lines gray, dotted, confused, subgeminate. Thoracic feet

black tipped, abdominal ones gray dotted. Tubercles in small black spots, ii of joints 12 and 13 larger.

Stage V.—As before, but the ground color pale brown, the reticulations black, the conspicuous fleck white; width 2.8 to 3.1 mm. Dorsal space bordered by the nearly black waved subdorsal band, the gray area above it segmentarily divided, filled centrally with dark dotted mottlings on a pale gray ground. Sides pale gray dotted, a dark band over the spiracles, and subventrally formed by the dottings being darker. Setae long, pale; spiracles dark. The shape is slender, narrowing a little on joints 10 to 13; anal feet rather large, the rest moderate, those of 7 and 8 smaller. Joint 12 very little enlarged. Shields concolorous.

Stage VI.—Head rounded, bilobed, the apex under joint 2; brown, heavily reticulate with black especially in a long transverse patch over the eye; epistoma and basal antennal joint wax white; width 3.7 mm. Body elongate, joint 13 tapering, cylindrical; feet short, pale. Brown, shaded with gray and black. Dorsal space waved, narrowed in the incisures; a broken, mottled, dorsal band and a distinct subdorsal one, irregular about tubercle i, composed of black mottlings on gray, filled between with red dotting on white. A broad, pale lateral space like the dorsal one, narrowly centered with blacker dottings. A black stigmatal band like the subdorsal one, diluted centrally; substigmatal band again pale like the dorsal filling, the subventral area dark, but not so dark as the dorsal marks. Tubercles, i to iv obscure, iv at the upper angle of the spiracle; v and vi large, black. Leg shields whitish, spiracles black; setae rather long and pale. The subdorsal and lateral black bands join posteriorly on joints 12–13, making the anal flap all black. On joint 11 a little white dash at tubercle ii and before spiracle.

Pupation in the ground. Larvae from Platte Canyon and Sedalia in the foot hills, June 1 to 20, the imago the following March.

Food plant—Oak, young leaves.

SYNEDA HOWLANDII Grote.

Eggs.—Spheroidal, the base slightly flattened, all slightly shining yellowish white, subtranslucent; coarsely pitted, the pits in vertical lines becoming less in number vertically by confluence, rounded, subangular, well defined; the spaces between are broad and too much rounded to look like reticulations. No ribs, the cross ridges as distinct as the vertical ones and like them; irregularly hexagonal. Diameter, 0.9 mm.

Stage I.—Head rounded, oblique, pale brownish with black ocelli and brownish line from them backward; width 0.4 mm. Body sordid whitish, the food green; a diffuse brown lateral band between warts i—ii and iv indistinctly composed of three lines. Shape elongate,

slender, feet on joints 9, 10, and 13, those of 9 and 10 approximate. Tubercles small, black; setæ pointed. Cervical shield concolorous with head; thoracic feet brownish, abdominal ones with dusky plates. After eating, the marks became faint and the larva looked sordid green.

Stage II.—Head rounded, oblique, the lobes bulging; whitish, with three brown bands on each lobe, the upper obliquely clouded, the lower, behind the black ocellus, narrow; with 0.6 mm. Body slender, feet on joints 9 and 10 (approximate) and 13, with minute stubs of feet on joints 7 and 8. Dorsal space greenish white, slightly streaked with traces of dorsal and addorsal lines. Subdorsal, lateral and broad suprastigmatal brown lines on a whitish ground; substigmatal band whitish; two subventral brown bands. Setæ stiff, dark, rather long from very small black tubercles. Thoracic feet black; abdominal ones brown lined. Joint 12 very little humped.

Stage III.—Head white with three geminate lines on each lobe, parallel to those of the body, the upper one abbreviated; width 1 mm. Body slender as before, whitish, subdorsal line double, fine, purplish black, the upper part narrow, waved; three fine lines above the white substigmatal band; three partly confluent and irregular reddish subventral lines and a dotted ventral one. Setæ distinct, dark, but tubercles obsolescent.

Stage IV (Interpolated).—As in the next stage; width of head 1.3 mm.

Stage IV (Normal).—Head white with three geminate, purplish black crinkly bands, reaching from the back of the lobe to the clypeus, pointed at the lower end; an erect mark over epistoma to apex of clypeus; sutures narrowly dark. Shape round, full above, slightly bilobed, larger than joint 2 but the apex a little covered by it, rather pointed at the mouth; setæ dark; width 1.5 mm. Body uniform, slender, the feet of joints 7 and 8 very small rudiments, those of 9 and 10 distinct, approximate, of 13 stretched posteriorly. Gray-white, traces of a dark dorsal line; subdorsal line double, the upper part waved, the lower crossing tubercles i and ii, linear, purple black; a faint single lateral line; suprastigmatal line double like the subdorsal one but straight, the upper part crossing tubercle iii, the lower iv; stigmatal band slightly more white than the ground; three subventral lines a little crinkled and irregular, especially the central one; venter gray-white, a half shade lighter than the dorsum. Feet pale, brown marked. Segments slightly wrinkly annulate especially posteriorly. Tubercles small, black; setæ black, distinct posteriorly.

Stage V.—Head rounded, scarcely bilobed, oblique, large at vertex, higher and wider than joint 2 but the apex retracted; whitish, three geminate gray brown dotted filled bands on each lobe and an erect mark in the clypeus; width 2.3 mm. Body gray, dotted banded. Dorsum brownish dotted filled, spaced by pale from the broad black

dotted, waved subdorsal band; sides very pale dotted filled, pale spaced; suprastigmatal band geminate, nearly black, dotted filled; substigmatal band white, shrunken by the fold, reddish filled. Below it a geminate, sparsely dotted filled reddish line, single subventral line and the pale venter sparsely dotted. The larva gradually tapers posteriorly, joint 13 being the smallest; slender, uniform. Tubercles a little elevated, white, black marked, iv at the middle of the spiracle. Central segments elongated; feet as before.

Stage VI.—Head large, round and full, wider and higher than joint 2 yet the apex retracted in the expanded end of the prothorax; median suture a little depressed, clypeus small. White, mouth a little luteous; an erect black dash in clypeus; three broad bands on each lobe from the occiput converging to the clypeus, black edged, filled with black and brown dots; width over 3 mm. Body slender, cylindrical, elongate; feet on joints 9, 10, and 13, with little rudiments on joints 7 and 8. Broad gray black subdorsal and stigmatal bands, sharply edged, black dotted filled. Dorsal space brown, thickly dotted on an ashy ground; a white speck at tubercle ii before, while the blackish subdorsal band is diluted with brown; lateral space pale ashen, finely dotted in dull red; a pale speck at tubercle iv; substigmatal band like the lateral space; venter sparsely dotted in blackish, illy defining a subventral band, colored like the substigmatal one. Tubercles dark gray, setæ small, dark. Tubercle iv at the lower edge of the spiracle.

Eggs from a moth flying over the foothills at Platte Canyon. The larvæ fed on *Eriogonum*.

SYNEDA HASTINGSII Henry Edwards.

Eggs.—Nearly spherical, a little flattened on the base, very slightly conoidal. Smooth, shining, dull yellow with a greenish olivaceous tint. No reticulations or ribs, the surface covered with slight, shallow depressions, their edges illy defined; diameter 0.8 mm.

Stage I.—Head rounded, oblique, luteous, diffusely brown streaked, scarcely bilobed; clypeus high, ocelli small, black; width 0.4 mm. Body long and slender, motion semilooping, the larvæ thrashing about violently before progressing. Slender, uniform, feet on joints 9, 10, and 13, rather long and well developed. Whitish, green from the food, a faint broad and clouded lateral vinous band. Tubercles very small, black, obscure. Cervical shield brownish, not cornified; feet, except the anal ones, black. Later the lateral shade resolves itself into three distinct lines—subdorsal, lateral, and suprastigmatal. There is a white substigmatal band and faint brown line subventrally; dorsal space whitish.

Stage II.—Head rounded, oblique, the apex under joint 2, full and smooth, the sutures not depressed, clypeus small; whitish, three dotted brown bands on each lobe and a faint linear streak dividing the clypeus

and epistoma. Body long, slender, feet on joints 9, 10, and 13, those of 9 smaller and approximate to 10, a pair of minute stubs on joints 7 and 8. Greenish white, a luteous streak dorsally, divided into segmental dashes swollen centrally; subdorsal line brown, diffuse, black dotted by tubercles i and ii; lateral, suprastigmatal, and two subventral brown lines, not very sharply defined. Thoracic feet black, the abdominal ones dusky. Tubercles round, dark brown, setæ short, stiff, pointed, black. Central segments drawn out, the end ones contracted.

Stage III.—Head as before, the three dotted bands geminate, yellowish white filled; erect brown mark over epistoma does not reach top of clypeus; width 1 mm. Body slender; dorsal line greenish white, widened segmentarily, black dotted edged, centered by a black dotted line broken in the incisures; space to the narrow brown subdorsal (i-ii) line gray; a single lateral, double gray-filled suprastigmatal and substigmatal (between iv and v) lines, the latter white; double subventral and single, somewhat shaded ventral brown lines. Thoracic feet black; abdominal ones brown lined.

Stage IV.—Head shaped as in *Syneda howlandii*, white, striped the same, the three dotted irregular bands on each lobe reddish brown; erect mark in clypeus; width 1.4 mm. Body slender, whitish, gray tinted. Dorsal line single reddish; subdorsal line geminate, purplish brown, dotted, irregular, waved, dark gray shaded segmentarily behind tubercle ii; two lateral and stigmatal dark dotted lines; three fainter subventral ones leaving the substigmatal band a little paler than the ground color. Tubercles in black spots, setæ black.

Stage V.—Head large, full above, higher and wider than joint 2, slightly oblique, the apex retracted; white, three dotted geminate black bands on each lobe narrowed before; an erect mark in clypeus blackish. Gray white, the single dorsal line reddish and widened on joint 2 anteriorly; subdorsal line double, dotted filled, gray shaded behind tubercle ii; lateral line single, suprastigmatal double, obscurely dotted filled; substigmatal band whiter than the ground color; three or four fainter dotted dark lines subventrally, reddish brown. Feet brown dotted, the shape as before.

Stage VI.—The same, but the lines more dotted filled; also the spaces filled in more with reddish dots; width of head 2.3 mm.

I am not sure that this larva is different from that of *Syneda howlandii*. I have given the notes on both somewhat at length, but the lines are all the same and the apparent differences may be due to different wording and to slight variations in the larvæ under observation. The larva of *S. hastingii* did not grow vigorously in the latter stages, as the widths of head show, and was somewhat undersized, possibly with the markings a little undeveloped. It fed on the same species of *Eriogonum* as the other larva.

Eggs from several moths caught flying at Denver and in the foothills.

Family AGARISTIDÆ.

ALYPIA MACCULLOCHII Kirby.

Larva.—Head rounded, bilobed, erect, white, thickly covered with rather large black spots and a few small ones; a yellow shade over vertices of lobes and at bases of antennæ. Body cylindrical, normal, noctuiform, joint 12 slightly enlarged dorsally. White with broad diffuse yellow shades subdorsally (tubercle ii) and substigmatally (tubercle v), the former becoming deep orange on the hump on joint 12. Tubercles large, black, but round and low, not elevated into cones. Many irregular, confused, crinkled black marks. No white subventral spots whatever, the black markings heavy subventrally; venter less heavily marked. Abdominal feet black at the base, flesh colored outwardly; thoracic feet black. Setæ long, white. The black markings form a series of broken lines and dots, a heavy, geminate, dorsal line, widened a little posteriorly on the segments and with a narrow median spur projecting laterally, more sparsely lined where the yellow color is; sides quite heavily marked; subventral region strongly marked, especially above the feet.

Larvæ on *Chamænerion angustifolium* resting on the backs of the leaves. Found at the Half-Way House above Manitou, July 21. The larvæ entered the earth to pupate in a few days and the first imago emerged May 4 the following season.

Family LASIOCAMPIDÆ.

MALACOSOMA TIGRIS Dyar.¹

Eggs.—Laid in a patch half as long as wide reaching halfway or all around a small twig. Elliptical, flattened on two sides, the larger end squarely truncate, rimmed, the nearly circular center raised; small end rounded. Laid erect on the small end, fastened together by gum, but the exposed ends clear of any varnish; the mass looks white and the spaces between the eggs are visible. Sordid white, a dark micropylar dot. Surface smooth, slightly shining, scarcely shagreened. Size 1 by 0.6 by 0.5 mm.

The egg masses were found on the lower twigs of the food plant, often very near the ground. Exactly similar egg masses were sent to the Department of Agriculture from Jonesboro, Coryell County, Texas, which hatched on April 5. *M. tigris* was then undiscovered and I could not imagine what these eggs were. A memorandum of the food plant was not sent me and the larvæ refused the plants that I offered them. This locality is somewhat distant from the place where I discovered the species; however, I insert my notes on the first stage of the Texan larvæ, as I believe that they are of the same species.

¹ Proc. Ent. Soc. Wash., V, Mar., 1902, p. 38.

Stage I.—Head rounded elliptical, higher than wide, black, epistoma white; setæ long, pale, secondary; width about 0.35 mm. Body normal, black, the anterior edges of the joints pale; a pale-orange subdorsal band on joints 5 to 11, fading out at the ends, sharp above, diffuse below and spreading laterally on the anterior and posterior parts of the segments, most so posteriorly. Subventral fold white. Warts small but elevated, black with small tufts of pale, rather stiff hairs.

Stage II not seen. The following stages are from the Colorado larvæ:

Stage III.—As in the next stage, but the bands more diffuse and paler colored; no blue markings. Width of head 0.7 mm.

Stage IV.—Head round, black, with pale secondary hairs; width 1.2 mm. Body normal for *Malacosoma*; a broad, geminate dorsal band, orange red, widened three times on each segment, most so posteriorly, extending on joints 4 to 11, faintly also on joint 3, suddenly absent on joint 12; a narrow, waved, cream-colored subdorsal line, absent at the ends; more orange markings laterally with traces of blue dottings between these; a blotched pale orange stigmatal band; subventral folds grayish. Ground color black, velvety on joint 12 and in the incisures of joints 2-3 and 3-4. Hairs rather sparse, of various lengths, faintly reddish, alike.

Stage V.—Width of head 1.8 mm. Much as before, but the lateral stripe is fine and broken and the subventral ones practically obsolete. There is more blue; a dot posteriorly above the subdorsal line, a large patch between that and the lateral line, subventral region blue-gray shaded, joints 12 and 13 blue streaked. Hair reddish dorsally, pale reddish subventrally. Subdorsal line forming a dot on the posterior edges of the segments. Posterior edges of segments yellowish.

Stage VI.—Head rounded, erect, the clypeus small, the paraclypeal pieces forming a shield-shaped area above the clypeus; velvety black, blue powdered, especially along the sutures; many secondary hairs; width, 3.7 mm. Body cylindrical, normal, joint 13 smaller; flaccid; warts obsolete, the hair subtufted dorsally and subventrally anteriorly on the segments, short, rather scant. Velvety black; dorsal line geminate, irregular, mottled, orange, inclosing reddish dorsal hair, widening and divergent posteriorly on the segments, moderately distinct, especially on joint 11, absent on joint 12. Subdorsal line distinct, irregular, broken in the segmental incisures, orange, absent on joints 12 and 13; traces of a lateral and a substigmatal line, orange, the lateral fairly distinct and followed below by orange tinted, white, subventral spots; joint 2 nearly all black. Blue transverse dashes in the subdorsal space, a short anterior and long posterior dash in the lateral space, the latter cutting the lateral line and reaching to the subventral space. On joints 3 and 4 this dash is very marked, curved, edging a

deep black space. Pale reddish or fleshy mottlings posteriorly on the segments in the incisures. The slight subdorsal warts on joint 2 black. A few black hairs dorsally from the obsolete warts i. Traces of a white dorsal line on joints 3 and 4.

Cocoon, as usual, of pale-yellow silk. Larvæ first seen in Mill Gulch, leading out from the Platte Canyon, later farther down the canyon, but not common. At Sedalia, however, they occurred numerously, and had defoliated acres of their food plant. Feeding on the oak, a dwarf tree in this vicinity, but only on the young leaves. Gregarious at first, as usual, but later wandering widely as the young tender leaves become scarce. The larvæ form no tent, but spin a slight web over the branches, which becomes a rather distinct mat at the times of moulting.

This species is nearest to the Californian *M. constricta* Stretch, but quite distinct in the character of the egg covering, which, in that species, consists of a great mass of white, frothy varnish.

Family GEOMETRIDÆ.

EUDULE UNICOLOR Robinson.

Eggs.—Elliptical, evenly rounded, one diameter less than the other, but no flattenings nor truncation; neither end perceptibly depressed. Pale ochraceous, the surface faintly reticulate in whitish, the lines broad, rounded, rather regular, a color, and not any perceptible structure; surface very finely and uniformly granularly shagreened. Skin very delicate, dents in when breathed upon and then flattens out again. Size 0.8 by 0.7 by 0.6 mm. Laid adherent, without threads. The eggs vary in size, some being but half the bulk of others though laid by the same female. Later the eggs turned orange color.

Stage I.—Head rounded bilobed, flat before and rather thin, erect, black. Body slender, greatly elongated, the segments slightly swollen subventrally. Thoracic feet distinct, approximate; abdominal ones small, normal, situated on joints 10 and 13. All pale yellowish, the thoracic feet gray tinted; faint subventral brownish segmentary spots. Tubercles small, black; setæ short, dusky, slightly enlarged at tip. Anal feet with oval blackish shields and a pair of similar convergent shields on the anal flap. A faint, subquadrate, luteous shield subdorsally on joint 2. Setæ of joints 6 to 13 directed obliquely backward, those of joints 2 to 5, obliquely forward.

Stage II.—Head rounded, bilobed, erect, free; dull brown, blotched with darker in the sutures and sides of lobes: width about 0.5 mm. Body slender, elongate, feet normal, approximate at its extremities. Pale brownish, greenish from the food; a broad blotched, partly faint subdorsal brown band; a round dark-brown blotch on tubercle iv on joints 5 to 9 and more faintly on joint 10; tracheal line whitish.

Segments finely obscurely annulate; setæ short, stiff, black; no shields.

The larvæ were not carried to maturity. The eggs came from a female taken in the mouth of Platte Canyon in the foothills, and their food plant was made out so late that they had been four days without food and were so weakened that they died in the second stage. The food plant is violet, but it was only after repeated efforts that this was discovered and a whole day spent in a special journey to the spot where the moth had been caught.

HYDRIOMENE TRIFASCIATA Borkhausen.

Larva.—Head rounded, free, light brown, sparsely mottled, dotted with dark; tubercles darker, as are the sutures and eyes; width about 2 mm. Body robust, flattened cylindrical, normal, smooth. Whitish like the oak-feeding Tortricids and Pyralids, more yellowish white on the ventral half, dorsum somewhat streaked on the annulets. A sordid blackish-green dorsal vascular stripe; an olivaceous luteous, rather broad, stigmatal stripe, red-brown at the spiracles. Tubercles sordid, blackish, moderate. Feet pale, shields concolorous, uncornified; tubercle iv substigmatal, posterior, faintly broadly whitish ringed.

The larvæ occurred on the oak, hiding between leaves and with the aspect of Pyralids, but true Geometrids in structure. They were found by Mr. E. J. Osler, at Cheyenne Canyon, near Colorado Springs.

SCIAGRAPHIA PERVOLATA Hulst.

Larva.—Head rounded bilobed, the lobes squarish, erect, flattened a little before; gray white, a broad black band over the vertices of the lobes and another across from eyes, but leaving the epistoma pale; black dots between the bands; width 1.8 mm. Body normal, not greatly elongate; tubercles elevated; setæ coarse and black. Bark gray; ground color whitish dorsally, but gray between tubercles i and ii; a reddish subdorsal band broken into spots below tubercles i and ii, the rest whitish. Lateral area gray mottled, the substigmatal fold white anteriorly on the segments; venter marked and dotted with grayish black. Tubercle vi double, or of two separate tubercles; i and ii nearly in line, the rest as usual; the tubercles of vii moderately separated. Plates spotted like the body, uncornified.

Found on wild gooseberry in the Platte Canyon, May 18; imago June 12. I am not sure that the moth is correctly named. I could not find any description to exactly fit the specimens; that of *S. pervolata* seems the nearest. The moths have the wings whitish gray, rather coarsely brown strigose; transverse anterior and posterior lines represented by diffuse clouds, the latter bent outward opposite the cell. A black patch at costa and at middle of wing occur just beyond the transverse posterior line and adjoin a broad, pale, ill-defined sub

terminal band; a terminal broken black line. Hind wings finely strigose, the margin wavy with brown discal dot and a shadow of a median line.

DIASTICTIS OCCIDUARIA Packard.

Larva.—Head rounded, erect, squarish, clypeus rather high; whitish, a large black patch covering vertex of each lobe and extending half way down the sides and front, leaving the median suture broadly pale; an angled patch over ocelli and one on lower part of clypeus, pointed above; epistoma pale, mouth black; width 1.6 mm. Body cylindrical, normal, the segments not elongated; feet rather small. Ground sordid white, with many black marks and two brick-red bands. Dorsal and stigmatal bands diffuse, red, the latter broken at the spiracles by the white ground color. Large black spots about tubercles i, ii, and iii, with numerous smaller dots between; iv and v black, v small; a continuous black subventral band, covering tubercle vi, below which the venter is pale gray, dotted by the scattered black tubercles vii and viii, sparsely mottled, becoming pinkish medially. Thoracic feet and spiracles black, abdominal feet gray, like the venter, with black tubercles. No shields; joints 2 and 13 white and black spotted, concolorous. Setae black, short, stiff.

Found by Mr. Oslar on the ground under willows near Denver. They did not feed, being matured. Moth, May 30.

ALCIS HAYDENATA Packard.

Eggs.—Shortly elliptical, nearly spherical, one diameter a little less but no flattening or truncation; about 14 longitudinal ribs, low, distinct, running to the antemicropylar end where they meet in a slightly confused reticulation. At the other end they stop abruptly at a ridge which represents the edge of the obsolete truncation; end reticulate. Ribs nearly straight, dotted faintly with two rows of pores; cross striae fine, parallel, not raised, not very distinct. Pale green; diameter 0.9 mm., the difference between the two diameters scarcely measurable.

Laid loose, rolling about in the jar.

Stage I.—Head rounded, mouth rather flatly truncate; dark brown, labrum and antennae whitish; width 0.35 mm. Body cylindrical, normal; moderately elongate. White; joints 2-4 and 10-13 look a little swollen and are honey yellowish; six red-brown transverse bands on the posterior halves of the segments 4 to 9, joined by a subdorsal line that is wide next to the posterior band, and nearly detached on the anterior rim of the segment; a lateral, more regular line, reaching nearly the whole length; bands broadly blotched on the venter and joined by a fine adventral line. Joints 2-4 and 10-13 marked over the yellowish with clouded dorsal and subdorsal purple-brown lines. Cervical shield and anal plate darkly sordid shaded. Feet dark, nearly black; the thorax and head held so as to look like a single black knot. Feet of

joint 10 paler, especially outwardly. Tubercles and setæ obscure, concolorous and pale.

Stage II.—Head round, bilobed, erect, flattish over the moderate clypeus; dark brown, a disjointed, submaculate, white band over the lobes to the clypeus, a large spot in clypeus, epistoma diffusely whitish, setæ pale; width 0.6 mm. Body cylindrical, moderate, normal. Posterior three-fifths of segments 5 to 9 banded in purplish brown, joined by a subdorsal line, widened where it joins the band in the centers of the segments. A finely linear dorsal line; venter wholly brown, only slightly streaked in whitish. Anterior two-fifths of segments white, annulate and slightly lumpy, cut into dorsal and lateral patches by the distinct subdorsal line. Joints 2 to 4 with the white predominating; dorsal and subdorsal lines uniform, subventral region brown, annulet incisures sordid. Joints 10 to 13 mostly brown, the dorsum luteous diluted; subdorsal, lateral and stigmatal white bands, submaculate, a little lumpy elevated. Feet brown, the abdominal ones white dotted.

Stage III.—Head rounded, flattened before, slightly bilobed, erect; dark brown, a white dotted edged band over the vertex of each lobe to the clypeus which contains some white dots; base of antennæ and mot-tlings on sides below pale; width 0.9 mm. Body moderate, cylindrical, normal. Segments finely irregularly annulate, not greatly elongate. Dorsal band white, widened segmentarily, sordid shaded; subdorsal dark brown, on joints 5 to 9 composed of intersegmental ellipses, narrowly joined and covering all of the lateral space, narrow on the thorax, confused and pale on joints 10–13. Lateral space white on the segments, narrowed to obsolescence in the incisures. Venter broadly dark brown, finely obscurely lined in pale. Feet brown, the abdominal ones whitish lined outwardly. Joint 2 dorsally dark brown as also the tip of the anal flap. White marks slightly mottled and cut by the annulet incisures, also slightly lumpy and folded on the sides. Tubercles and setæ obscure.

Stage IV.—Head rounded, scarcely bilobed, erect; brown-black, white dotted; a broad, short, pulverulently edged, white band on vertex of each lobe, cut off before into a dot; bases of antennæ and epistoma white; width, 1.3 mm. Body as before, black-brown with dorsal and stigmatal, continuous, segmentarily widened, white bands, nearly pure, cut by the fine annulets, containing black dots at tubercles i and iii, respectively. Dorsal band broad on joints 2 to 4, double on joint 2 with triplicate brown center, broadly blurred on joints 3 and 4, brown dotted; powdered and confused with dots on joints 10–12; joint 13 white dotted. Lateral band uniform on joints 2 to 13, the feet of 10 and 13 narrowly white lined without, otherwise dark. Venter finely, faintly lined. Faint orange blotches behind the spiracles.

Stage V.—Head squarish, rounded, thick, flattish before, vertex slightly notched; black, finely white dotted; a broad, rectangular band

on the vertex of each lobe, white, containing two black dots; epistoma white. Dots small, mostly uniform, a little strigose and waved, especially in the clypeus; width 1.7 mm. Body normal, rather robust; brown-black; a broad distinct, sharply edged, white band, narrowed at the segmental incisures, a similar stigmatal one faintly orange blotched below and between the spiracles. Subdorsal space velvety, finely white dotted like the head; venter finely lined in whitish, pulverulently; medio-ventral band rather broad, cloudy triplicate. On thorax the dorsal band replaced by a pair of subdorsal bands, creamy orange tinted, irregular, subconfluent. On 10-13 dorsal band widened, more irregular and containing black dots; tubercle ii of 12 enlarged, white; anal flap black-brown, white dotted; a white bar from the stigmatal line on the upper halves of the feet of joints 10 and 13. Feet and spiracles black; tubercles small; setae fine, short, dark. Segments finely and rather numerous annulate, finely so anteriorly and posteriorly.

Eggs from a female taken at Pine Grove, July 19. The larva reached the stage last described September 29 and began to hibernate, but had not enough vitality to survive the winter. It was apparently not mature. It fed on wild cherry and *Polygonum*.

ENEMERA JUTURNARIA Guenée.

Egg.—Elliptical, one diameter much less than the other but not sharply flattened, not depressed at either end; micropylar end roundly truncate, the other abruptly rounded, both about alike but differentiated by the sculpturing; truncation slightly oblique. The two sides are not symmetrical. The egg is laid loose, rolling about, and if rolled, always stops with the same side up. This side has a single median impressed groove; the lower side two such grooves. Twelve broad, longitudinal, raised ridges join a similar ridge about the rim of the truncation, broadly waved, rounded, beaded with a double row of minute pores, joined by diffuse transverse ridges to form squares and also by numerous fine, obscure, transverse lines, about eight to the square. Beginning one square from each end the two central ridges are approximated, the space between depressed as a deep, smooth groove. On the other side the two median hollows are depressed, their bordering ridges less sharply approximate, the grooves crossed by striae. In one egg the double grooves began, one of them at one square, the other at two squares from the truncation, but both ended sharply and evenly at one square from the other end. In another egg this was reversed. In still another there was but a single groove, but it was not central and was less deeply marked than the dorsal one. Micropylar end coarsely reticulate, the upper end lumpy from the confused ridges. Color green, turning dull pink, with the ridges paler. Size, 0.9 by 0.7 by 0.5 mm. Eggs from three females examined, alike

with the variation indicated. The ridges overhang the dorsal groove, projecting as white rims, serrated by the projected pores, which appear as little brown teeth. Ventral grooves more variable, not overhung by the ridges.

The eggs were obtained in July, but did not hatch till the following April. They are evidently scattered over the ground by the moths, where they lie all the autumn and winter. The dry climate doubtless favors their preservation, while their peculiar ribbed structure may serve as a safeguard against too much dryness.

I have described the larva previously.¹

EPIPLATYMETRA COLORADARIA Grote and Robinson.

Eggs.—Laid adherent; elliptical, one diameter considerably less, rounded, rather squarely; both ends abruptly rounded, about alike, not really truncate; center a little constricted and one end a little depressed. About 14 low raised ridges, longitudinal, parallel, stopping at the rim at the micropylar end, reaching the other end confused into reticulations. They carry a double row of pores but obscure, rounded; cross striæ fine, obscure, parallel, not raised. Color pale whitish green. Size 1.1 by 0.8 by 0.6 mm. The rim about the micropylar flattening is more distinct than the ribs; the end is nearly smooth, slightly radially reticulate near the rim.

Stage I.—Head rounded, very slightly bilobed, oblique; very pale brown, a little vertically streaked. Body moderate, normal, whitish, a broad, straight, distinct, pale purple-brown band subdorsally on joints 2 to 13, not quite reaching the end, the pair separate, only touching at the middle of joint 13, where they terminate. A similar broad, pale-brown ventral band. Feet pale, ocelli black, sutures of the moderate clypeus brown.

The eggs were obtained from a female moth at Pine Grove, Colorado, in the foothills at an altitude of 8,000 feet, but no suitable plant could be found for the young larvæ when they hatched.

Family NOTODONTIDÆ.

ODONTOSIA ELEGANS Strecker.

Egg.—Hemispherical, the base flat; opaquely white, not shining; finely and densely covered with small, white granulations, arranged obscurely in vertical lines, a little denser about the vertex, which is narrowly clear with a small central white space. Diameter 1.4 mm.

Stage I.—Head bilobed, free, shining black, the sutures broadly and lower parts of lobes diluted brown; width 0.65 mm. Body cylindrical, normal, anal feet elevated, segments subannulate. White, shining, the quadrate cervical shield, anal plate, leg plates, thoracic

¹Entom. News, V, 1895, p. 63.

feet, and tubercles shining black. A faint vinous shading dorsally on joints 4, 5, 6, and 12, and distinct subventral sordid vinous blotches the whole length. Tubercles normal, ib and iii, especially iii, larger, ia and ib separate, iv behind the spiracle; no subprimaries. Tubercles distinct, polished, black, the setae pale and obscure. Joint 12 slightly enlarged, tubercles i and ii of joint 13 anteriorly in a square; joint 11 rather weak. The larva ate patches halfway through the leaf on the upper surface and rested beside them.

Stage II.—Head erect, high, narrowing above, a low vertical notch, flattish before; pale luteous, the vertices of lobes narrowly tipped in smoky brown, ocelli dark; width 1.2 mm. Body cylindrical, joint 12 slightly enlarged, anal feet weak, approximate, but used. Whitish green, smooth, a white subdorsal line; subventer and feet broadly dark vinous, the anal ones only narrowly lined with this color; thoracic feet black. Tubercles large, a little elevated, but whitish, almost concolorous with the body, inconspicuous. Segments irregularly annulate; no shields.

Stage III.—Head pale greenish luteous, punctate dotted in darker, the sutures of mouth brown, sutures of clypeus and a central line also dark; ocelli blackish; width 1.6 mm. Body cylindrical, normal, joint 12 with a small, sharp, dorsal hump. Green, yellowish shaded on the thorax and along stigmatal line, subventer blotched with vinous, running down on the outer sides of the feet. Anal feet small, vinous lined, used. Spiracles small, black ringed. Segments subannulate, slightly shining, joint 6 with a very slight annular swelling.

Stage IV.—Head high, flattened before and at the sides, vertex slightly notched; pale green, blotched with dull red on the sides below and about the mouth, shading upward; width 2.5 mm. Body cylindrical, joint 6 with a central, slight, collared elevation, 12 with a broad, low hump. Green, the space between the spiracles and the feet broadly shaded in purple brown, slightly shading upward toward the dorsum, more distinctly on the hump and quite darkly on the annular elevation of joint 6. Thoracic feet and abdominal ones outwardly dark purple brown; spiracles black ringed. Tubercles slightly elevated, green; anal feet small, used. Venter broadly pale green. The transverse purple lines of joints 6 and 12 become more distinct with growth. Later the dull vinous color shades nearly up to the dorsal line, the purple dorsal ridges of joints 6 and 12 are slightly relieved by whitish.

Stage V.—Head higher and wider than joint 2, rounded, flattened on the front and sides, narrowed a little above and slightly bilobed; shining, smooth, yellowish green from the clypeus to vertex centrally, the clypeus and sides shade in dark brownish red; mouth dark red; surface shagreened slightly, making the red shade mottled-reticulate in greenish; width, 3.5 mm. Body cylindrical, joints 6 and 12 with

low, collared, dorsal humps; anal plate rounded, smooth, small; no shields. Feet moderate, equal, the anal pair a little smaller, but used in walking. Dorsum shaded in vinous brown mixed with grayish, only a trace of green in the incisures dorsally; venter narrowly green. Thoracic feet red-brown, the foot of joint 7 and the others in a less degree with a purple brown streak outwardly. Humps narrowly pale gray, spotted and streaked in purplish black. Tubercles whitish with black hair dots, a little elevated, distinct, normal. Spiracles large, white, black rimmed. The dark mark on the hump of joint 6 is an irregular black band from behind the spiracle over the dorsum and an elongate spot between tubercles i and iii. Joints 2 to 5 are more reddish than 6 to 13, having no gray; the hump of joint 12 is reddish and the gray consists of traces of the collar markings of joints 7 to 11, most distinct at the spiracles. Later joints 2 to 6 are a little smaller in diameter than the rest of the body, joint 2 slightly widened and pale on the sides. The body becomes all lilaceous except narrowly ventrally with the same marks, but no distinctly different reddish tints. Anal plate with a narrow red rim.

Larvæ found on aspen at Bailey's in the Platte Canyon, mixed with *Pheosia dimidiata*, which they greatly resembled in the egg stage. A larva entered the earth to pupate July 31, and the moth emerged May 6 the following season.

In the last stage the larva rests on the twigs of its food plant, which it closely mimics in shape and color.

Family COCHLIDIIDÆ.

TORTRICIDIA TESTACEA Packard, variety CRYPTA Dyar.

I had no expectation of finding a slug caterpillar in Colorado, as the climate seems too dry. However, Mr. Caudell netted a female moth in a narrow, wooded gulch leading off from the Platte Canyon, not far below Bear Gulch. The moth differs only slightly from the Eastern *Tortricidia testacea*, being paler and less strongly dark shaded, but the larva shows some rather unexpected differences, showing it to be a distinct local variety of that species. The pattern of markings is more generalized in the Rocky Mountain race.

Eggs.—Elliptical, flat, but rather thick and arched, translucent, slightly yellowish, the reticulations obscure; size, 0.8 by 0.5 mm., all as usual in the family.

Stage I.—As in the Eastern species, the subdorsal spines Y-shaped, the anterior prong shortened on the hinder segments, especially on joint 11; not strongly alternating, yet perceptibly so; greenish translucent, the ridges whitish; head green, eye black, mouth brown; skin smooth. All normal, no markings.

Stage II.—Elliptical, joint 13 quadrate, normal, narrowed behind. Depressed spaces large and deep, all present; ridges and latticed elevations between the depressed spaces densely papillose granular, especially around the margin; setæ distinct, short, dark, pointed, normal. All faintly whitish; latticed ridges of dorsal space 1 granule wide.

Stage III.—Elliptical, normal. Green, a yellow subdorsal line centrally, reaching farther posteriorly than anteriorly; a round, red spot crossing the subdorsal lines, but yellow edged and paler centered, situated on joints 7 and 8.

Stage IV.—The purplish-red spot is rounded, a little larger than before; yellow subdorsal line not quite reaching the extremities. The larva now eats the whole leaf.

Stage V.—The patch is irregularly triangular, occupying about a third of the dorsum; it covers depressed spaces (1) of five joints and reaches the middle of the side; a red dash on joint 3. The yellow lines reach to the anal end, but not to the head.

Stage VI.—The patch reaches the anterior and posterior extremities narrowly, on the sides to the depressed space (4) of joints 7 and 8, with a little point toward (4) of joints 6 and 9. It is as in the normal *T. testacea*, except that the patch did not reach below the middle of the side, being exactly as in some fully marked examples of *T. cæsonia*. The larva had but six stages.

Eggs June 1, mature larva July 14.

Family PYRALIDÆ.

MELITARA JUNCTOLINEELLA Hulst.

Larva.—Head rounded, slightly bilobed, held flatly; clypeus nearly reaching vertex, the sutures depressed; bright red-brown, epistoma paler, ocelli black; width 2.1 mm. Body slightly flattened, the segments strongly 2-annulate; cervical shield large but rather narrow, transverse, shining black; anal plate very large, black. Tubercles small, black, i and ii in line, iv + v, normal. Feet with the crochets in an ellipse. Dark purplish, nearly black; skin coarsely wrinkly shagreened; spiracles rounded, black. Thoracic feet brown; setæ fine, brown, rather long. On the thorax ia + ib, iia + iib; on joint 13 anteriorly a medio-dorsal shield and on joint 2 a small crescent before the spiracle, not contrasted.

Larvæ feeding gregariously within the leaves of the prickly pear cactus were found on the prairie near Denver, May 11. They had obviously passed the winter as half-grown larvæ in this situation and were feeding rapidly. However, it proved impossible to breed them, and the above supposition as to their identity was gained from the capture of a female moth on the prairie near Golden, June 5.

ACROBASIS BETULELLA Hulst.

Larva.—Head round, black, coarsely shagreened, epistoma sordid white. Body purplish black, the segments coarsely 3-annulate, not shining. Tubercles small, black, corrugated radially, iv and v closely approximate, in line. Anal plate black; feet normal, setæ rather long, fine.

Spinning a web among the leaves of birch and living in a cone made of frass united with silk. Platte Canyon; imago July 1.

PIONEA BELIALIS Druce.

Larva.—Head small, flat, half retracted in joint 2, black, the sutures pale. Cervical shield bisected into two quadrangular halves, distinctly separate. Body nearly cylindrical, uniform, robust, incisures only slightly marked; anal plate brownish, feet normal. Pale yellow with large, conspicuous, round, black tubercles; ia+ib, iia+iib, iv+v, iiiia present, large, situated above and before the spiracle, vii a single brown-black tubercle, viii distinct on the legless segments. Crochets of abdominal feet in a broad ellipse, narrowly broken outwardly. Thoracic feet black, the abdominal ones like the body. Spiracles small, black-rimmed.

The larvæ are leaf miners in an herbaceous, aromatic plant, *Coleosanthus grandiflora*, growing in bunches in moist spots in the foothills. I found them in a gulch near the mouth of the Platte Canyon. The mine forms a large brown blotch extending through to both epidermes at the terminal part of a leaf, occupying three-fourths or more of the surface. At maturity, the larva emerges and spins up a three-cornered box in one of the soft, young leaves at the end of the shoot where it pupates. This leaf becomes wrinkled with growth.

Larvæ found matured July 11, at which time there were only a few left, most having pupated. The moths began to emerge at once.

A Tachinid parasite, *Isoglossa hastata* Coquillett, was raised from the larvæ.

A specimen of the moth was sent to Prof. C. H. Fernald, who says that it should be referred to the genus *Cybalomia*. He adds that it reminds him in appearance of *Titanio helianthiales* Murtfeldt, which is also a leaf miner in the larval state.

Family PTEROPHORIDÆ.

OXYPTILUS DELAWARICUS Zeller.

Larva.—Head rounded, whitish. Body light green with a rather broad white subdorsal stripe, containing a round creamy patch on joints 6 and 7; feet normal, slender. Tubercles i and ii united, single haired, the hair of i leaning forward, ii backward; tubercle iii single haired, leaning forward, iv and v united, not strongly oblique; vi

single haired, directed backward; vii with three hairs on the leg base, one stronger than the others; no secondary hairs, the skin finely granular. On the thorax tubercles ia and ib united, iia + iib, iii + iv + v, vi double. No shield, but six setæ in two rows, three on the prespiracular wart and two on the subventral.

The pupa is winged as in *O. periscelidactylus* Fitch.

Larvæ on the wild grape in the Platte Canyon, June 1, moth out June 11. The larvæ were mature when found and ready to pupate, but there was no sign on the plants of spun up leaves, such as the allied species makes.

The specimens were at first determined as *O. periscelidactylus*, as they agree with a moth so labeled by Professor Fernald, bred at the Department of Agriculture on grape (No. 4440). The wide dissimilarity of the larvæ (*O. periscelidactylus* has warts and secondary hairs) led me to reexamine the moths. *O. delawaricus* is extremely similar to *O. periscelidactylus*, much more so than the descriptions by Walsingham and Fernald would imply. It is smaller, the palpi are shorter, the antennæ completely white ringed, and the space between the white lines on the feathers of the fore wing is dark brown, contrasting with the rest of the wing. Otherwise I see no differential characters.

The following are the notes made at the Department of Agriculture on the number 4440, above referred to:

May 29, 1889. Tortricid? on grape from J. B. Schaffer, Deward, Pennsylvania. Larvæ uniformly greenish yellow with darker median line and somewhat paler head. The hairs arising from the warts are long, rather coarse, and colorless. * * * They remind one of *Nola*. Moths issued June 9-11.

PTEROPHORUS SULPHUREODACTYLUS Packard.

Larva.—Thick, flattened, tapering at the ends; feet normal, slender. Head rounded, bilobed, the apex under joint 2, mouth projecting; width about 1.2 mm.; black, the sutures broadly brown. Body without secondary hairs, the warts low and diffuse; i with three or four, ii with one hair, these warts somewhat approximate; iii with several hairs; a group of six hairs on the subventral fold without wart and a hair posteriorly in line, absent on some segments; several hairs for tubercle vi. Olivaceous green, a broken, broad, sordid white subdorsal line along warts i and ii with four black dots on each segment between in a square, becoming black blotches on the posterior segments. Wart iii pale; spiracles black; skin finely dark granular; cervical shield blackish, hairy; thoracic feet black, the abdominal ones pale. Hair white, minutely glandular tipped; segments obscurely 2-annulate; a black impressed lateral dot in the middle of the segment.

The larvæ were found webbing up the young heads of a wild sunflower, *Helianthus pumilus*, and feeding within the spun mass. They occurred on the foothills near Boulder Creek Canyon. Spun among dead leaves; emerged June 10.

PLATYPTILIA COSMODACTYLA Huebner.

Larva.—Head round, vertically bilobed posteriorly, pale testaceous. Body cylindrical, normal, green, a dull crimson dorsal line with a small oblique subdorsal dash on joint 6 and a dash on joints 5 to 12; a white subdorsal line from joint 2 posteriorly to 13 anteriorly and a broken subdorsal one the larger anterior part on each segment oblique. Tubercles small, hairs single, i and ii separate, iv and v approximate, v anterior and dorsal to iv. On thorax ia+ib, iia+iib, iv+v, numerous fine, short, secondary hairs, shorter and easily differentiated from the primary ones, bulbous tipped. Hairs all white, not long, inconspicuous.

The larva was found resting on the red fruit bract of *Lonicera involucrata*, and was not observed to feed, being matured and pupating immediately. Apparently the larvæ do not eat the leaves, but more probably the flowers. Found at Pine Grove, Platte Canyon, altitude about 7,000 feet.

ALUCITA CINERASCENS Walsingham.

Larva.—Head long, the mouth pointed, apex under joint 2; whitish. Body flattened, narrow, not tapering. Tubercles i and ii approximate with one long and several short hairs, iii singled haired, iiib several haired, iv+v large, many haired, the others retracted subventrally. Translucent green, with obscure, straight, subdorsal and broken lateral lines, the latter above tubercle iii. Warts black, i+ii largely so, and forming a double row of distinct spots separated by a straight line of the ground color. Anterior edge of joint 2, posterior rim of reduced cervical shield and warts of anal flap also black marked. Hairs white, spinulose; none secondary. Pupa free, not in a cocoon.

Larvæ in the heads of *Helianthus pumilus*, near Boulder Creek Canyon, May 23; moths issued June 12. Eggs were obtained from these which passed the winter without hatching, showing the species to be single brooded with hibernation in the egg state.

Egg.—Oviform, elliptical, one end more pointed than the other, both slightly truncate at the extreme tips, strongly and sharply flattened on two sides, like cakes cut out of dough; pale yellow, opaque, not shining, the surface slightly shagreened, not sculptured. Size, 0.55 by 0.4 by 0.15 mm.

Family TORTRICIDÆ.

TERAS FOLIANA Walsingham.

Larva.—Head rounded, the apex under joint 2, paraclypeal pieces reaching vertex; red brown, shaded sordid at the mouth, ocelli black; width 1.2 mm. Body translucent, soft green, not shining; cervical

shield large, pale luteous, black rimmed posteriorly. Tubercles large, colorless, a little elevated, normal, iv+v. Male glands large, dark purple. Feet and setæ pale, no marks.

Abundant on the *Cerocarpus parvifolius*, folding the leaves and living within the houses so formed; pupa in a folded leaf. Some of the bushes suffered severely from these larvæ. The moths were common flying over the dry foothills in July among the *Cerocarpus* bushes at Platte Canyon and Manitou; doubtless also throughout the range.

CACOEZIA ARGYROSPILA Walker.

Larva.—Head pale luteous brown, a black line on sides and ocelli black, jaws brown. Body green, cervical shield all green, translucent, tubercles pale, a little elevated, normal; no marks.

Another larva had the head pale brown with a darker line along the side on ocelli and jaws. Cervical shield all translucent green with a trace of brown tint, unbordered. Body all green; first pair of thoracic feet black, the rest green. Dorsal vessel dark.

Another larva had the head black, diluted with whitish irregularly on the face; thoracic feet black ringed, those of joint 4 less strongly so. Cervical shield black edged, luteous centrally, shading to whitish translucent in front. Body all green.

Another larva had the head greenish testaceous, black below at mouth but epistoma pale; width 1.5 mm. Cervical shield translucent greenish testaceous, shading to brown-black at the edges. Body translucent sordid green, slightly olivaceous dorsally, tubercles broadly paler, elevated, rather large; segments coarsely 2-annulate dorsally; male glands faintly yellow. Setæ long, pale, normal; ia+ib, iia+iiib, iv+v. No anal plate. First two pairs of thoracic feet blackish marked, the last pair brownish.

I give these several descriptions to illustrate the variability of this larva. It is especially unfortunate, as the larvæ of several other Tortricids are closely similar to this and hard enough to distinguish anyway. The species occurred on oak, willow, ash, and box elder, generally distributed but not locally very abundant.

CACOEZIA VIVIDANA Dyar.

Larva.—Head slightly bilobed, flat, jet-black or partly diluted on the face; cervical shield luteous except for dots at the borders. Body slender, cylindrical, the feet short, segments irregularly 3-annulate. Sordid translucent green, a clearer dorsal and subdorsal line; tubercles round, white, distinct, with coarse white setæ; iv+v. Spiracles black ringed; thoracic feet black with paler joints, abdominal ones pale. Dorsum faintly olivaceous shaded. Male glands in joint 9 showing as an ochraceous shade.

Webbing up the leaves of *Rubus deliciosus* in the Platte Canyon,

May 25. Others from wild cherry mixed with *Cenopsis directana*, from which I do not know how to distinguish them. This is not more than a variety of *Cacoecia argyrosipila*; it has the same markings, but bright red brown on a pale yellow ground. All the specimens are from Colorado, while *C. argyrosipila* is widely distributed. I have thought best to give it a distinctive name. It has been bred at the Department of Agriculture under the No. 4464.

CACOEZIA SEMIFERANA Walker.

Larva.—Head black, diluted whitish on the face; cervical shield greenish, black on the edges. Body translucent green, blackish from the food. Male glands yellowish, subventral fold somewhat opaque. Feet pale, those of joint 2 black.

Webbing the leaves of oak and apparently confined to this tree. A number of very young ones were collected in the Platte Canyon May 18, mixed with other Miero larvæ on the young oak leaves. Imago, June 11.

CACOEZIA NUGUNDANA Dyar.

Larva.—Head rounded, obliquely extended, pale green, ocelli black, jaws brown. Body tortriciform, slender, normal, rapidly moving. All translucent pale green, tubercles inconspicuous, eoneolourous, setæ pale and rather long; dorsal vessel dark. Male glands light yellow, distinct. Feet green; no marks.

Spinning up the leaves of the box elder, defoliating the trees in Denver and Golden, not seen on any of the trees in the Platte Canyon. The moth is very like *C. semifera*, but is very markedly paler; I think it a distinct species. The larva is always entirely green in all stages while the other larva has a black head, only becoming whitish on the face in the last stage. The food plants seem constant for both.

Professor Fernald tells me that Professor Riley had named this moth after its food plant as I have done, but I am not aware of any published description nor was he.

CACOEZIA CERASIVORANA Fitch.

These well-known larvæ were found in the Platte Canyon, webbing up a mass of leaves of the wild cherry into a head, within which a large number of them were found. Head, shields, and tubercles are black, the body shaded blackish all over. Male glands yellowish. Imago, June 24.

CACOEZIA ROSACEANA Harris.

Larva.—Head brownish luteous, epistoma white, apex under joint 2. Body all green, slightly shining, no marks; cervical shield large, green, narrowly black rimmed at the sides and behind continuously. Tubercles small, slightly elevated. Thoracic feet pale, the anterior ones dark brown; crochets of abdominal feet in an ellipse.

Other larvæ had the head black or partly brown over the vertex; shield diluted green in front, brown centrally. Body all green without dorsal shade, the feet of joint 2 black. These were bred from a large patch of eggs laid in a flat mass overlapping like shingles. The eggs were on a woodbine leaf, but the larvæ did not like this plant. I bred them on wild cherry. Other larvæ taken on plum, wild cherry, and oak. In stage I the head was shining black, mouth paler; bilobed, held obliquely. Body slender, submoniliform; all pale yellow without shields or plates. Tubercles obsolete, setæ obscure. In stage II the head was pale luteous, the body greenish, transparent, no marks. After that the head and cervical shield were black till the last stage, when the black was more or less replaced by luteous brown. Moths issued August 9.

LOPHODERUS COLORADANA Fernald.

Larva.—Head whitish, bilobed, partly under joint 2. Body slender, all pale green, translucent; segments 3-annulate; tubercles whitish, a little elevated, under lens concolorous, colorless, elevated, and moderately large; iv+v. Shield all concolorous, no marks. Feet normal, crochets in a complete ellipse of several rows.

Spinning a somewhat tube-like web in the seed heads of *Pulsatilla hirsutinum* high on the foothills back of Golden.

CENOPIS DIRECTANA Walker.

Larva.—Head and shield black; width 1.5 mm. Body green, broadly olivaceous shaded dorsally, leaving the tubercles pale, joint 13 green. Thoracic feet black, abdominal ones short, normal. Other larvæ had the head mahogany red, the sutures black; cervical shield partly brown-red in front.

The larvæ occurred on wild cherry in the Platte Canyon in May. The moth is very variable, but a distinct species, I think. Professor Fernald makes it a synonym of *C. reticulatana*,¹ but it may be separated from Northern specimens that I have under that name. Lord Walsingham's figure² can be closely matched by some of my specimens. Others are much suffused with brown.

PLATYNOTA LABIOSANA Zeller.

Larva.—Head flat, the apex under joint 2; shining black, the epistoma and bases of antennæ white; width about 1.2 mm. Body slender, flexible, tapering a little at the ends, scarcely flattened; segments strongly 3-annulate, creased in the incisures. Cervical shield large, black, narrowly bisected by pale; prespiracular and subventral tubercles large, black; thoracic feet shining black, abdominal ones short,

¹Trans. Am. Ent. Soc., X, 1882, p. 20.

²Ill. Lep. Het. Brit. Mus., IV, 1879, pl. LXIV, fig. 4.

normal, green, slightly dark shaded; anal pair dull black. Body slightly translucent sordid olivaceous green, dorsal vessel narrowly dark; the subventral fold looks lighter when well folded; no marks. Tubercles rounded, rather small, slightly elevated, with black hair-tubercles, but the plate concolorous with the skin; iv+v, ia+ib, iia+iib, one above the other. Spiracles black with pale centers. Setae rather long, dusky.

Webbing up the leaves and stem of *Argemone mexicana*, the pupa in a folded leaf with the end bitten off. Often injurious to the plant, as they eat the growing stem, distorting the plant. Also found on a species of *Gilia*, but perhaps as an accident. Found at Golden and Boulder, near or on the prairie.

The United States National Museum has fragments of two specimens, one labeled in Zeller's handwriting, the other taken by Belfrage in Texas, July 2. Mr. Busck thinks that they may have been part of Zeller's types; they certainly agree with his description. My specimens run larger, though some are of the same size, and the banding on the fore wings is heavier, not being so much confined to the costal edge as in Zeller's specimens. But the sexes are marked alike, which confirms me in the determination, as it is an unusual character in this genus.

Family YPONOMEUTIDÆ.

ORCHEMIA DIANA Huebner.¹

Larva.—Head rounded, bilobed, sutures depressed, pale reddish, whitish on the paraclypeal pieces and mouth, a black line on the posterior side of lobes. Body slender, tapering a little at the ends; translucent greenish yellow, scarcely distinctly colored; a dull white dorsal band of pigment, somewhat cut by the annulets, touching tubercle i, well defined. Tubercles large, black, round, a little elevated; iv+v, normal. A diffuse yellowish white stigmatal band. Setae moderate, pale. The food shows dark green or sordid, being especially visible subdorsally.

Cocoon large, a broad sheet of white silk, under which the true cocoon is formed, tube like, enlarged in the middle.

The larvæ were very common on the birch in the Platte Canyon, more especially higher up, at an altitude of 7,000 feet; also on the foothills back of Golden at a similar altitude. The birches were often completely defoliated by the larvæ, except for the leaves which served to support the cocoons, though these were often distributed over

¹Professor Fernald identifies this species with the European *O. diana*. I have seen but two specimens of this rare species, and both differ from the American form, of which I possess now a large series. Our moths are very dark, with no trace of the greenish overlying scales of the European ones. They may, perhaps, be separated under the varietal name *betuliperda*.

neighboring low plants. At the Half Way House on the Pikes Peak Railroad, at a similar altitude to the places where this species occurred so abundantly farther up the range, no specimens were seen and the birches were uninjured. The species, therefore, seems to be local in its appearance. Prof. C. P. Gillette spoke to me of this species as one that he had long observed to be destructive to the birch.

The larva lives under a delicate web which it spins over the surface of a leaf, held above the surface by the curl of the leaf. It eats the parenchyma on the upper side, skeletonizing the leaves, which become brown and dry.

CEROSTOMA RUBRELLA Dyar.

Larva.—Flattened, the dorsal section rounded triangular, strongly tapering at both ends. Head small, elongate, held nearly flat, with broad high clypeus, vertex under joint 2; pinkish, mottled over the lobes with large, pale brown spots; clypeus and epistoma, with antennæ and anterior thoracic feet whitish, somewhat mottled; ocelli and tips of antennæ dark; width 1 mm. Body thickest at joints 5 and 6; shields nearly concolorous, not contrasted. Slate gray, dorsal line yellowish brown, pale yellow edged, a little irregular and clouded, faintly cutting the cervical shield, which is pinkish gray, edged with neat black tubercles; stigmatal fold obscure, faintly shaded in yellowish and brown. Feet normal, pale. Tubercles small, black, distinct, whitish ringed; iv and v separate, iv a little dorsad; on joint 3 ia and ib approximate, separate on joint 4; iia + iib, iv + v. Setae distinct, brownish. A few white lateral dots and some stigmataly; segments obscurely about 6-annulate.

Solitary on the backs of the leaves, perfectly exposed and spinning no web; on *Berberis repens*, Boulder Creek Canyon; also in other canyons, but less commonly. Larvæ active, jumping off the leaves when disturbed.

The moths resemble the European *Cerostoma radiatella* Donovan, which has been recorded also from America. They are similar in shape and size, and are like one form of that variable species in coloration. But they are not variable, my 12 specimens being absolutely uniform, besides which the larva and food plant are different. I have, therefore, thought them deserving of a distinct name.

Palpi clothed with black and a few white scales, longer at the end of the second joint; face black and white scaled; vertex with long red brown vestiture, basal joint of antennæ and neck narrowly white; antennæ white and black banded below. Thorax and fore wings above smooth red brown with bronze reflection, an obscure lighter ray from the base along the submedian vein, distantly edged above with a few black scales which are more distinct on the outer half of the wing. Abdomen and hind wings silky blackish, as are all the wings below, the costa of fore wings only narrowly pale. Legs and abdomen below pale gray, shining. Expanse, 14 mm.

Family GELECHIIDÆ.

GNORIMOCHEMA COQUILLETTELLA Busck.

Larva.—Head rounded, elongate, vertex under joint 2, clypeus triangular, high, not reaching vertex; ocelli black, jaws brown; width 0.8 mm. Body somewhat flattened, incisures distinct, segments faintly 3-annulate; cervical shield reduced, the front part membranous; anal plate large, shining. Skin transversely wrinkled. Tubercles moderate, shining, but weakly cornified, i slightly dorsal to ii, iv + v; ia and ib nearly separate, iia and iib confluent, iv + v. On abdomen the upper seta of iv + v is anterior and smaller. Feet normal, short, the crochets in a small, complete circle, all pale. Setæ moderate, pale. Color sordid yellowish or whitish, head pale testaceous, sutures brown, ocelli black.

The larvæ form false galls on the terminal twigs of *Bigelovia*. The terminal leaves of a young growing tip become united into a fusiform gall-like enlargement, forming a tight box. Every leaf or part of one that touches the inside of the cavity of the box is swollen in that part of its surface; the swollen parts become yellowish and the leaves adhere together, forming the four or five sided box. The tip of the stem bearing the box is recurved. Larva within the hollow, destroying the bud. Frass in the pointed tip. These curious formations, looking like large flower buds, were found commonly in a few places in the Platte Canyon and on the prairie near Denver. When occurring at all, they were generally abundant. They were not found, however, until too late in the season to be successful in rearing the moths. Still, they seem obviously to be the same as the species described by Mr. Busck.

As Mr. Busck's paper on the Gelechiidæ, in which his description would naturally appear, is delayed, I have asked him to furnish the description in advance, which he has kindly done. I append it.

GNORIMOSHEMA COQUILLETTELLA Busck, new species.

Antennæ dark brown with narrow silvery white annulations. Labial palpi of typical *Gnorimoschema* form; second joint whitish sprinkled with brown scales and with a black bar on the outside; terminal joint black with a white annulation around the middle. Face whitish; head and thorax whitish, heavily overlaid with dark fuscous. Forewings with basal fifth light yellowish brown, which color is continued outward and downward in a tapering curved streak along dorsal edge to beyond middle of the wing. The ground color in the rest of the wing is pale bluish white with each scale tipped with black. Adjoining the basal fawn-colored area is a semi-circular costal region, heavily overlaid with dark fuscous, and outside this is another similar costal dark area not so well defined. In the first of these dark semicircles, on the middle of the cell, is a dark reddish-brown dot, surrounded by a few fawn-colored scales, and below the second costal semicircle, at the end of the cell, is another similarly edged spot. A few dark fuscous scales are sprinkled irregularly

over the apical part of the wing, and the extreme apex is dark fuscous. Hind wings silvery fuscous, darkest along costa and toward the tip; cilia yellowish. Abdomen dark silvery fuscous; legs whitish, shaded with dark fuscous.

Alar expanse 11.5 to 14 mm.

Habitat.—California.

Food plant.—*Applopappus pinifolius*.

Type.—No. 6288, U. S. N. M.

Described from many specimens bred by Mr. D. W. Coquillett and Mr. A. Koebele, from thin-walled oblong galls, formed by the undeveloped bud of *Applopappus pinifolius* near Los Angeles, California.

ANACAMPSIS INNOCUELLA Zeller.

Larva.—Head rounded, flatly outstretched, vertex under joint 2; black or brown with black sutures. Body normal, scarcely flattened, a little smaller at the ends. Cervical shield slightly rugose, brown and black behind and at the sides, shading to whitish before. Skin transparent, appearing white from the fat, food obscurely green; dorsal vessel dark. Tubercles moderate, rounded, black, ia+ib, ii+iii, iv+v. Thoracic feet black; abdominal ones normal, short; no anal plate.

The larvæ occurred as leaf rollers on the broad-leaved cottonwood (*Populus fremontii wislizeni*) at Denver. The leaf is neatly rolled to several turns, forming a remote spiral, held with cross bands of silk throughout. The end is open, and the larva can be seen in the center. Sometimes several leaves are involved.

NEALYDA BIFIDELLA Dietz.

Larva.—Head small, flat, clypeus rounded triangular, reaching the broad, membranous, vertical triangle, mouth small; pale luteous, sutures of clypeus brown, ocelli small, black. Body moderate, flattened, joint 2 smaller than 3, 4 and 5 equal, then slightly enlarged to the middle of abdomen and a little tapering to end. Segments angularly projecting laterally posteriorly; joint 13 small, divided, the posterior half abruptly smaller. When retracted the segments are flattened moniliform. Thoracic feet small, slender, wide apart; abdominal ones on joints 7 to 10 like slender papillæ, with a spoon-shaped enlargement at tip, in shape much like the thoracic feet, without hooks; no feet on joint 13. Translucent pale yellow, whitish pedally; joint 2 dorsally and ventrally shagreened; no shields. Setae iv and v distinct, remote, in line, v smaller and just below the spiracle, iv posterior; vi rather distinct, but dorsal setæ obsolete.

Living in blotch mines under the upper epidermis of the leaves of *Allionia nyctaginea*, the mine nearly reaching through to the under surface; small for the size of the larva, the frass gathered in a bunch at the end. Found at Salida July 25; moth August 8.

GELÈCHIA RIBESELLA Chambers.

Larva.—Head rounded, mouth large, projecting, clypeus high; greenish luteous, shining, faintly brownish mottled, ocelli black in an aggregated patch. Body cylindrical, normal, segments 3-annulate; green, a not very bright, white, subdorsal line; shield large, faintly luteous. Tubercles small, without plates, black; ia and ib separate, ii+iii, iv+v. On abdomen iv+v, but not on a common shield; i to iii are distinct, showing as black dots, the rest smaller. Setae moderate, brownish. Feet all pale.

In spun-up leaves on *Ribes cereum* at Bailey's, in Platte Canyon, July 13; imago July 18.

GELECHIA UNCTELLA Zeller.

Larva.—Head rounded, vertex under joint 2; pale luteous, ocelli black. Cervical shield whitish, immaculate. Body slender, tortriciform, whitish with even purplish-brown bands as wide as the spaces between; subdorsal, lateral, substigmatal with a faint cloud subventrally. Feet all pale. Tubercles minute, setae fine; spiracles dark. A faint, broken, medio-ventral dark band. Anal plate small, pale. Tubercles iv and v approximate, v dorsal. Tubercles dark, without plates.

Webbing up the leaves, often gregarious, forming a large mass of web and leaves in a ball; on *Lupinus* and *Thermopsis montana* at Boulder Creek Canyon and foothills back of Golden.

GELECHIA PRAVINOMINELLA Chambers.

Larva.—Head pale luteous, shaded over vertices of lobes with reddish; ocelli black. Shields and anal plate pale, translucent, luteous tinted. Body opaquely whitish; subdorsal, lateral and suprastigmatal, blotched, irregularly edged, dull purple bands, leaving the small black tubercles in the pale parts. Tubercles ia and ib separate, ii+iii and iib approximate, iv+v, v very small. A trace of subventral purplish shadings. Setae moderate, pale. Feet normal, short, green.

The larva folds a young leaf of the aspen with web which reaches down to the petiole and stem, broad, band-like, and cobwebby. It forms a tube within the folded leaf. Found at Pine Grove in the Platte Canyon July 9. Moth emerged July 22.

GELECHIA ANARSIELLA Chambers.

Larva.—Head rounded, apex in joint 2, shining black, labium and epistoma pale. Body rather thick but flattened. Cervical shield large, black, all of joint 2 black, joint 3 vinous black except in front which, with joint 4 in front, is narrowly but conspicuously collared in bright white. Rest of body green, faintly brownish shaded to the spiracles, then clear green; a faint, broad, whitish subdorsal line

along tubercles i and ii. Thoracic feet black; a faint whitish dorsal line; anal flap whitish, dark punctate before. Feet normal, green. Tubercles black, white, ringed; ia and ib separate, iia+iib, iv+v, v small.

Larvæ on *Ceanothus*, spinning a delicate web over the leaf it is feeding on, hiding in a silken tube in a folded leaf or between leaves. Found at top of Chimney Gulch, Golden, July 9; imago July 20.

GELECHIA VERSUTELLA Zeller.

Larva.—Head pale testaceous, sutures about clypeus, paraclypeal pieces and bases of lobes more or less black shaded. Body moderate, tortriciform, green, with a distinct pale subdorsal line; sides somewhat fluted. Tubercles minute, setæ moderate, white, iv and v united. Feet normal, short; head setæ long, white. When mature the larva becomes shaded with pink and enters a place of concealment to transform.

Found in folded leaves on the cottonwood at Denver, May 31. Moths out June 26.

GELECHIA OCELLELLA Chambers.

Larva.—Head rounded, bilobed, oblique, apex under joint 2 when retraced; luteous brownish mottled, sutures narrowly nearly black, or the head all shining black; epistoma scarcely paler. Cervical shield black with a pale dividing line and luteous patch in each half, or the patch merely a narrow, somewhat impressed dash. Green, dorsum all shaded in purplish; narrow dorsal, broader subdorsal, fainter and slightly broken lateral and stigmatal whitish bands; joints 3 and 4 green dorsally in the incisures. Tubercles pale, concolorous, hair tubercles black; normal, iv+v, ia and ib separate, iia+iib. Body normal, the incisures depressed. Feet of joints 2 and 3 black, or pale, black tipped. Abdominal feet green.

Found in folded or cut leaves, slightly webbed, on the poison ivy (*Rhus toxicodendron*), in the Platte Canyon July 3; imago July 19

Family TINEIDÆ.

GRACILARIA PNOSMODIELLA Busck.

Larva.—Head moderately flattened, bilobed, clypeus band-shaped but narrowed to a rounded point at the vertical triangle; pale luteous; mouth and sutures brown. Body nearly cylindrical, segments angularly moniliform, no shields. Tubercles and setæ both pale, somewhat developed, several visible even dorsally. Thoracic feet short, obliquely extended; abdominal on joints 7 to 9 and 13, sessile, with a little bunch of hooks. Dorsum and venter of joint 2 shagreened. All pale yellowish, no marks. Segments subequal, the center of the abdomen a little enlarged.

Mining in the leaves of *Pnosmodium carolinianum* on the prairie at Golden near the foothills. A large blotch mine under the lower epidermis, the upper side a little swollen and yellow. Finally the leaf becomes brown and dead on both sides. Imago July 26. The moths proved to belong to an undescribed species, but Mr. Busck has prepared the following description which is submitted in conjunction with my note on the larva:

GRACILARIA (DIALECTICA) PNOSMODIELLA Busck, new species.

Antennæ as long as fore wings, simple, dark bronzy with indistinct, narrow, white annulations; basal joint without pecten, whitish. Labial palpi silvery white, somewhat loosely scaled beneath toward apex. Maxillary palpi distinct, porrected, silvery white. Fore wings shining coppery golden with silvery white markings edged with black. At basal third is an oblique white costal streak reaching down to the fold, where it bends outward and is prolonged somewhat along the fold; between this and the apex are three equidistant triangular, white, costal spots; the first at middle of wing, the second at the beginning of the costal cilia, and the third in this cilia. Opposite the intervals between these three costal spots are two dorsal, white, triangular spots, and the base of the dorsal edge is white. All these white markings are sharply edged by thin black lines. Dorsal cilia golden, apical cilia white, a short, perpendicular black cross line. Under side of thorax silvery white; legs white with broad black annulations; spurs white; posterior tibiæ pectinated above. Abdomen shining dark purple, with broad white transverse bands on the under side; anal tuft white.

Alar expanse 8 to 9.5 mm.

Habitat.—Colorado (Dyar).

Food plant.—*Pnosmodium carolinianum*.

Type.—No. 6267, U.S.N.M.

This beautiful and singularly marked species may fall in Lord Walsingham's genus *Dialectica*¹ when the group to which it belongs has been critically worked up. *Dialectica* is distinguished from *Gracilaria* by the pectinated posterior tibiæ. It is nearest and very similar in ornamentation to *Coriscium albinatella* Chambers,² but is easily separated by the pure white palpi, by the first costal streak which does not reach down to the white basal part of the dorsal edge, and by several smaller differences in ornamentation.

GRACILARIA THERMOPSELLA Chambers.

Larva.—Head flat, rounded, broadly bilobed at vertex, clypeus triangular, reaching the vertical triangle; smoky luteous, translucent, ocelli black; half retracted in joint 2. Joint 2 flattened dorsally, projecting at the sides, without distinct shield. Segments nearly equal, 4 and 5 a little smaller, tapering a little behind, 13 suddenly smaller, slender, divided. Body behind joint 2 nearly cylindrical, submoniliform, segments dented subannulate; shining, pale greenish yellow without marks. Setæ nearly obsolete, a few pale ones on the sides. Feet on joints 7 to 9 and 13 with a bundle of hooks directed backward, not in a definite ellipse. Thoracic feet moderate, directed downward.

Leaf miners in *Thermopsis montana* under the upper surface, the

¹Proc. Zool. Soc. Lond., 1897, p. 150.

²Can. Ent., IV, 1872, p. 25.

frass pushed out through a hole below. The larvæ readily emerge from the mine and start a new one in another leaf, entering by a slit which they make on the under side. The mature mine is a large, lobed hollow under the upper epidermis. The young mines are long and tortuous, on the under side, not widening. Found at Baileys in the Platte Canyon July 13. First imago July 25.

LEUCOPTERA ALBELLA Chambers.

Larva.—Head flat, rounded, a band-shaped clypeus, narrowed a little above; whitish, two black ocelli visible on the upper aspect, three on the lower; mouth small pointed, the brown mandibles small, normal. Body slender, flattened, laterally moniliform; joints 2 and 3 larger than 4 and 5, 6 to 10 again a little larger, subequal, 11-12 and 13 tapering, 13 divided, but the segments of equal width. Cervical shield present as a slightly wrinkly area but perfectly concolorous, whitish. Male glands large, filling the whole dorsum of joints 9 and 10, yellowish faintly, segmented. Thoracic feet very short, appressed, projected laterally but not exceeding the edge of the body. Abdominal feet sessile on joints 7 to 10, those on joint 13 a little larger. Venter of joint 2 subcornified, the feet almost rudimentary. White, no marks, no visible setæ.

Leaf miners in the narrow-leaved cottonwood at Morrison and on the foothills back of Golden. A large, black, blotch mine under the upper epidermis, eaten through continuously to the lower epidermis, making a large dead area in the leaf. Several larvæ in each mine, feeding side by side. Frass contained. The larvæ were very abundant where they occurred, nearly destroying all the leaves on large trees, though the individual larva is so minute. When they spun, the remaining leaves of the tree and adjoining foliage were spotted with their white cocoons, covered over by cross bands of silk. First found June 28, by Mr. Candell.

LITHARIAPTERYX ABRONIÆELLA Chambers.

Larva.—Head small, the apex in joint 2, rounded, clypeus triangular, touching the vertical triangle; sordid luteus, mouth brown, sutures of clypeus brownish, ocelli black; labium large. Cervical shield brown, bisected into two triangles, the edge dotted by black tubercles. Body slender, cylindrical, segments submoniliform and almost equal, slightly tapering at the ends. Not shining, rather opaque pale green; tubercles small, black; ia+ib, iia+iib, iv+v on thorax; on abdomen, i dorsad to ii, iv and v remote, iv perceptibly dorsad, vi normal. Segments biannulate, the subventral fold rounded, prominent. No marks.

The pupa is flattened, resembling a seed with a wing-like margin. It is green at first, but soon turns brown. The larvæ form variously

shaped blotch mines, with a hole by which the frass is extruded; they also spin among the terminal leaves or flower bracts with a delicate web in which the frass is contained. The food plant is *Allionia nyc-taginea*. Larvæ from Salida July 25. First imago August 4.

LITHOCOLLETIS CINCINATIELLA Chambers.

Larva.—Strongly flattened, the segments projecting roundedly laterally; joint 2 large, 3 smaller, then gently enlarged to the center and tapering to end. Dorsal and ventral plates the whole length, subcorneous, nearly colorless. No feet; black spots in place of the thoracic feet, and dark scars on joints 7 to 9 and 13. Dorsal marks on joints 2 to 4 just like the ventral foot scars. Head triangular, very pointed, the mouth widened by the transverse, projecting labrum; ocelli black, one remote above the others; palpi projecting nearly at right angles; clypeus band shaped, broadened above, edged by the parallel paraclypeal pieces; pale luteous, sutures and mouth black. Body whitish, purple dotted on the sides of the segments, dark orange on the sides of joint 2 and anterior half of joint 3. A dorsal and ventral diffuse purplish shade, not quite reaching the ends.

The mine is large, 30 mm. or more in length, flat, slightly ribbed; several larvæ in a mine. Found on oak at Manitou. Usually the oaks were not infested with leaf miners, but this place proved an exception. The species were, however, members of the Atlantic Coast fauna. *Lithocolletis basistrigella* Clemens, *L. fitchella* Clemens, and *Tischeria cincipennella* Clemens were the other species occurring on the oaks at Manitou.

LITHOCOLLETIS SALICIFOLIELLA Clemens.

Larvæ in elliptical blotch mines under the lower epidermis, white, finally eating through to the upper epidermis in dots and patches, usually mostly so about the edges; mine about 17 by 9 mm.; a slight fold down the long diameter. Singly or, rarely, two on a leaf.

Larva.—Head cordate but only very slightly lobed, clypeus high, band shaped, but narrowed to a point where it touches the vertical triangle, whitish, the sutures and a diffuse shade on lateral margin brown; a black speck with a smaller one within on the face of each lobe; several black specks on the ventral aspect of lobe; antennæ small but distinct. Body arched above, gently flattened below, moniliform, joints 3 and 4 larger than 2, 5 small, then gradually larger to 9 and gradually smaller to 13, which is scarcely divided and not sharply smaller. Cervical shield weak, concolorous. Joints 2 to 6 white, 7 to 12 yellow, with large, rounded, brown-black dorsal spots, flattened posteriorly; dark ventral spots on joints 6 to 12 and a faint one on joint 5; joint 13 somewhat translucent, luteous above and below. Thoracic feet large, projected laterally, exceeding the body, well jointed;

abdominal ones sessile, represented on joints 7 to 9 by a bunch of crochets behind and a single row before each planta; on 13 a more distinct foot, with double row of crochets broken on the inside and outside. No feet on joint 10. *Setae* long, brownish, from small, distinct tubercles; ia and ib in a group; ib larger; iia and iib somewhat anteriorly placed, iib large; iv and v present. On abdomen i and ii nearly in line, ii larger; iii above and a little behind the small, anteriorly situated spiracle; iv below and well behind; v and vi obsolete. Subprimary tubercles all absent, apparently by reduction. No ventral *setae*. Skin finely granular, shagreened, not distinctly so.

Younger larvæ were all colorless, the head the same but with black ocelli at the edge. Anal end well rounded, the segments subequal throughout. *Setae* apparently the same.

The cocoon is elliptical, 7.5 by 4 mm., formed in the center of the mine. Mines in the broad-leaved cottonwood in Denver. Imago July 2.